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A series of studies were made to determine who the gifted student was, the attitudes towards him and the career aspirations that he had. In the first study, in which the Outstanding Traits Test was administered, a wide variance of attitudes toward gifted children and their careers was found among the parents and teachers. The second and third tests attempted to show that there are two types of gifted students: the creative student and the intelligent student. The separate ways of thinking of these two groups were also explored. In an attempt to identify and study classroom behavior of elementary school students, Hunter College observed and tested experimental classes of children. From these tests giftedness was able to be identified in one or more of five intellectual ability traits. Secondly, it was found that children were not significantly benefited by specialized instruction in their major area of ability, according to these tests.

Gifted high school students were compared on motivation, adjustment, and family factors in order to ascertain 1) differences between low and high achievers, 2) differences between boys and girls. The results of this test are given in detail and can be an aid in developing a program for gifted students.

"Project Talent," a study of the gifted to provide vast amounts of raw data, creates many research opportunities for enhancement of the knowledge about gifted youth.

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The Gifted Student

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THE GIFTED STUDENT

Research Projects Concerning Elementary and Secondary School Students

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FOREWORD

THIS MONOGRAPH, the second of a series, is composed of four research projects that have received support from the Cooperative Research Program, U.S. Office of Education. This program functions under Public Law 531, 83d Congress, which authorizes the Commissioner of Education to "enter into contracts or jointly financed cooperative arrangements with universities and colleges and State educational agencies for the conduct of research, surveys, and demonstrations in the field of education."

The reports of completed research projects are now being received in the Office of Education. To disseminate the findings of these projects, selected reports will be published in the monograph series. In this issue four research projects have been included because they all focus on one area.

The first monograph dealt with one project on mental retardation. In the future the pattern will remain the same. Some issues will be concerned with only one selected research project; when more than one project pertains to a rather specific problem area, the related reports will be combined in one monograph.

ROY M. HALL,
Assistant Commissioner for Research

DAVID L. CLARK,
Director, Cooperative Research Branch

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The Gifted Student

The Study of Giftedness:

A Multidimensional Approach

J. W. Getzels and P. W. Jackson
University of Chicago

The three reports that follow are excerpts from a study of giftedness now under way at the University of Chicago. Both the exploratory character of the investigation as a whole and the preliminary nature of the results presented here must be emphasized. The first section [1] deals with an inquiry into the different meanings and values attached to the idea of giftedness by the several groups in our society most involved in the adolescent's life—his parents, his teachers, and his peers. The second section [2] briefly reports on an investigation differentiating two types of gifted adolescents, those who are highly intelligent but not so highly creative and those who are highly creative but not so highly intelligent. Various issues related to the performance of these two types of adolescents in school are also examined. The third section [3] presents the results of an inquiry into the occupational choices and career aspirations of the adolescents identified in the preceding study. What do the highly intelligent and the highly creative adolescents want to do as adults? What is their image of adult success? A suggestion is offered toward a theoretical formulation for the results obtained in these inquiries.

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[1] Adapted from a paper entitled, "The Social Context of Giftedness: A Multidimensional Approach to Definition and Method," read at the American Sociological Society meetings, Seattle, Wash., Aug. 1958.

[2] Adapted from a paper entitled, "The Highly Creative and the Highly Intelligent Adolescent: An Attempt at Differentiation," read at the American Psychological Association meetings, Washington, D.C. Aug. 1958.

[3] Adapted from a paper entitled, "Occupational Choice and Cognitive Functioning: A Study of the Career Aspirations of Highly Intelligent and of Highly Creative Adolescents," read at the American Psychological Association meetings, Cincinnati, Ohio, Sept. 1959; to appear in the *Journal of Abnormal and Social Psychology*.

THE SOCIAL CONTEXT OF GIFTEDNESS

A study in differential perceptions

"Giftedness" as related to children is most frequently defined as a score on an intelligence test, and typically the study of the so-called gifted child has been equated with the study of the single IQ variable. This unidimensional definition of giftedness leaves the field open to at least two types of error: (1) The obvious limitation of the single measurement, which not only restricts perspective of the broader phenomenon but places on the one concept a greater theoretical and predictive burden than it was intended to carry; (2) the failure to distinguish between the single psychometric meaning of giftedness and the many social contexts within which it appears in practice. It is, for example, often taken for granted that the gifted child as psychometrically defined is equally valued by teachers and by parents, in the classroom and at home, that he is held to be an equally "good bet" by teachers and by parents to succeed as an adult, and that children themselves *want* to be gifted.

This study shows that none of these assumptions may be safely held. The gifted child is not equally valued by teachers and by parents, in the classroom and at home; he is not held to be an equally good bet by teachers and by parents to succeed as an adult; and children themselves do not necessarily want to be gifted, at least not as this is usually defined by the conventional test.

Despite its long acceptance the psychometric model is not infallible. Indeed, it may be argued that in many ways the model is only a historical accident, a consequence of the fact that the locale of early inquiries in the field was the classroom and the teachers comprised the reference group. If the social context is changed from the classroom, and the reference group from the teachers, qualities defining giftedness for other situations may be identified just as the IQ has been for the classroom. In fact, if the original criteria of learning were changed, it would change the qualities defining giftedness even in the classroom situation. To cite only one example, if the context of learning involved the production of novelty rather than the remembrance of things known, then creativity as well as IQ might become the appropriate defining quality of giftedness.

The purpose of this investigation is to examine the research consequences of an attempt to study giftedness in children within a multidimensional or sociologically-oriented model instead of the more traditional unidimensional or psychometric model.

Problem

With these considerations in mind, the following questions were raised regarding the giftedness of children:

1. How do teachers and parents, the most significant figures in the formal education of children, define the gifted child?
2. How are these definitions of the gifted child related to two simultaneous but different social contexts, his desirability by teachers in the classroom and his desirability by parents in the home?
3. How are these definitions of giftedness related to the qualities believed by teachers and parents to be needed for success in adult life?
4. How do the personal aspirations of children themselves compare with the definitions of giftedness (i.e. of what they ought to aspire to) held for them by parents and teachers?

Subjects, Instruments, and Procedures

The first step in attempting to answer the questions was to construct an instrument called the Outstanding Traits Test. On the basis of the literature in the field, all the qualities describing the gifted child or giftedness in general were listed. One of the qualities was clearly intelligence, but it was only one; others were social skill, emotional stability, a wide variety of interests, creativity, superior school achievement, health, and so on. In all, 11 such characteristics were found. This list was presented to graduate students, parents, teachers, and others with instructions to add or subtract qualities of such social or personal prestige that a child endowed with one or more of these characteristics would be called "gifted." Two more qualities were added as a result; the Outstanding Traits Test then consisted of 13 descriptions of giftedness. No claims are made as to the exhaustiveness of the qualities listed. However, it was found that after numerous trials, no qualities of the same order of generality were either added to or subtracted from this list.

1. *How do teachers and parents define the gifted child?*

The Outstanding Traits Test was administered to 14 women teachers and 28 mothers. They were asked to rank the children described in the test on the degree to which they would be willing to call them gifted. The findings were quite straightforward. Both teachers and parents ranked the qualities in essentially the same order; the correlation between the two rankings was 0.86. Thus, the first six teacher rankings were, in the following order: IQ, good marks, creativity, goal-directedness, social skill, and moral character. The first six parent rankings were: Creativity, IQ, goal-directedness, social skill, good marks, and wide interests. In effect, it may be concluded that teachers and parents tended to define the gifted child in more or less the same terms.

> 2. *How are these definitions of the gifted child related to his desirability by teachers in the classroom and by parents in the home?*

The Outstanding Traits Test was presented to the teachers again, and they were asked to rank the children once more on each of the qualities described, this time "on the degree to which you would like to have them as members of your class." The rankings obtained with these instructions were compared with the rankings already obtained when the same teachers were asked to rank the same qualities for giftedness. The results were again straightforward. The two rankings were quite similar, the correlation between them being 0.86.

The procedure was now repeated with the parents. The Outstanding Traits Test was again presented to them, and they were asked to rank the children once more, this time "on the degree to which you would like to have them as members of your family." Now interesting results began to appear. The rankings obtained with these instructions bore *no* resemblance whatsoever to those obtained from the same parents for giftedness—the correlation between the two was exactly *0*. For example, the three qualities ranked highest by the parents as defining the gifted child were creativity, IQ, and goal-directedness; the three qualities they ranked highest as defining the child they wanted in the family were emotional stability, moral character, and social skill.

In effect, the teacher wants the gifted child, as he defines him, in the classroom; the parent does not appear to want the gifted child, as he defines him, in the family.

> 3. *How are these descriptions of giftedness related to the qualities believed by teachers and parents to be needed for success in adult life?*

Teachers and parents were asked to rank the children described in the Outstanding Traits Test "on the degree to which they will succeed in adult life." These rankings were then compared with those already obtained from the same group for the definition of giftedness. The results were startling. The relationship between the teacher-defined qualities of the gifted child and the qualities which teachers felt made for success in adult life was *nil*—the correlation between the two rankings was 0.11. That is, the qualities the teacher held to be most characteristic of the gifted child were not related to the qualities which he believed most likely to make for success when the child grows up. For example, the three qualities ranked highest for defining giftedness were IQ, good marks, and creativity; for predicting success in adult life, they were social skill, goal-directedness, and emotional stability. (The correlation for the rankings given by parents was 0.51.)

In this connection, the qualities teachers want of children in the classroom were also compared with the qualities they believe make for success in adult life. The correlation was 0.01. (The parallel correlation between the qualities parents want of children in the family and those they believe make for success in adult life was 0.58.)

In effect, if the case may be overstated somewhat, what the teacher appears to be saying is: The children who are gifted are the children I like to teach but *not* the ones who I feel will be successful as adults. Here then is one dilemma of educating the gifted child, as he is generally defined: the characteristics held most desirable for children in the classroom are not the same characteristics held most likely to make for success when the children reach adult status. This impression could well be communicated to the child in some subtle manner.

4. *How do the personal aspirations of children themselves compare with giftedness as defined by teachers and parents?*

The Outstanding Traits Test was administered to approximately 450 high school students who were asked to rank the different children "on the degree to which you would like to be like them." These rankings of what might be called the self-ideal of children were then compared with the rankings already obtained from teachers and parents. The correlations varied for boys and for girls, for teachers and for parents, but they were uniformly *low*—no correlation exceeded 0.30, and two were negative. For example, the first three qualities selected by girls as those they would like for themselves were social skill, moral character, and emotional stability. High marks, IQ, and creativity ranked toward the bottom. It will be recalled that IQ, high marks, and creativity were exactly the qualities held most characteristic of giftedness by both teachers and parents.

The point to be made is that children aspire to qualities different from, if not antithetical to, the qualities their teachers and parents ascribe to giftedness; they seem instead to aspire to qualities their teachers and parents hold predictive of success. In this sense, children do not want to be gifted; they would much rather be successful.

Summary

The relevant findings may be summarized as follows: (1) Although teachers and parents defined the gifted child in the same terms, teachers appear to *want* gifted children in the classroom; parents appear *not* to want them in the family; (2) The relationship between qualities defining giftedness in children and qualities believed to be essential for success in adult life is *nil* for teachers, somewhat higher but still low for parents; (3) The personal aspirations of children themselves are generally *unrelated* to their teachers' and parents' definitions of giftedness.

THE HIGHLY CREATIVE AND THE HIGHLY INTELLIGENT ADOLESCENT

An attempt to differentiate two types of giftedness

Although few would argue that the terms "creative" and "intelligent" refer to independent classes of phenomena, still fewer would seriously propose that the two terms are synonymous. Despite this recognition of relative independence at the theoretical level, when turning to practical problems involving the assessment of the two qualities, one finds that the well-established intelligence test is most frequently used as *the* indicator of creativity. Individuals are grouped by IQ, and generally there is disappointment if the high-IQ person is not also creative. Sometimes he is not. There is also bewilderment when the creative individual has a relatively low IQ, as is often the case. Theoretical issues in the study of higher cognitive functioning and current practical problems in the search for talent make the importance of differentiating the two concepts in empirical terms self-evident.

Problem

The central purpose of this research is to discover significant variables differentiating the creative from the intelligent person. Specifically, the present study examines the achievement motives, fantasy productions, school performance, and teacher preferences of two types of adolescents: those exceptionally high in creativity but not in IQ, and those exceptionally high in IQ, but not in creativity.

Subjects, Instruments, and Procedures

The subjects were drawn from 449 adolescents comprising the total population of a midwestern private secondary school. The experimental groups were composed on the basis of performance on the following tests:

Standard IQ tests.—A Stanford-Binet, a WISC, or a Henmon-Nelson score was available for each adolescent. The scores obtained from the WISC and the Henmon-Nelson were converted by regression equation to comparable Stanford-Binet IQ's.

Five creativity tests taken or adapted from Guilford and Cattell or constructed especially for the study:

1. **Word association.** The subject was asked to give as many definitions as possible to fairly common stimulus-words; e.g., "bolt," "bark," "sack." His score depended upon the absolute number of definitions and the number of different categories into which these definitions could be put.
2. **Uses for things.** The subject was required to give as many uses as he could for objects that customarily have a stereotyped function attached to them; e.g., "brick," "paperclip." His score depended upon both the number and originality of the uses he mentioned.
3. **Hidden shapes.** The subject was required to find a given geometric form that was hidden in more complex geometric forms or patterns.
4. **Fables.** The subject was presented with four fables in which the last lines were missing. He was required to compose three different endings for *each* fable: a "moralistic," a "humorous," and a "sad" ending. His score depended upon the number, appropriateness, and originality of the endings.
5. **Make-up problems.** The subject was presented with four complex paragraphs, each of which contained a number of numerical statements; e.g., "the costs involved in building a house." He was asked to make all the mathematical problems he could that might be solved with the information given. His score depended upon the number, appropriateness, and originality of the problems.

On the basis of the IQ measure and the mean of the five creativity measures, two experimental groups were formed:[4]

1. *The high creativity group* (26 students: 15 boys, 11 girls)—students in the top 20 percent in creativity, compared to students of the same age and sex, but not in the top 20 percent in IQ.
2. *The high intelligence group* (28 students: 17 boys, 11 girls)—students in the top 20 percent in IQ, compared with students of the same age and sex, but not in the top 20 percent in creativity.

The two groups were then compared to each other and to the population from which they were drawn on the following variables: School performance as measured by standardized verbal and numerical achievement tests appropriate to each grade level; teacher preferences on having them in class; N-Achievement as measured by conventional scoring of responses to six of McClelland's stimulus-pictures. In addition to the conventional scoring, the N-Achievement protocols were also sorted "blind" for the creative and a matched noncreative group and finally analyzed systematically for the creative and intelligent groups by categories suggested in the blind sorting.

---

[4] The initial samples of highly creative and highly intelligent subjects were larger than the final experimental groups. Because of the goals of the overall project, students who were also especially outstanding in qualities such as psychological health or morality were made the subjects of special study. In a sense, the present two experimental groups may be said to represent relatively "pure" creative and intellectual giftedness since they at least do not include adolescents who were also gifted on the other qualities studied in this research project. A more detailed account of the selection procedures is contained in a report now in preparation.

Results

The results (see tables 1 and 2) may be summarized as follows: (1) Despite the striking differences in mean IQ, the creative and the intelligent groups were *equally* superior to the total population in school performance as measured by standardized achievement tests. (2) Although it might be expected that creativity would contribute to status in a school setting, especially since the achievement of the highly creative subjects was at least as good as that of the highly intelligent subjects, it was actually the *intelligent* group rather than the *creative* group that was preferred by teachers when compared with the average student. (3) The two groups did *not* differ from the population in N-Achievement as scored conventionally. (4) Although failing to show differences when scored for N-Achievement,

TABLE 1.—Means and standard deviations of highly creative and highly intelligent groups on experimental variables

Variables	Total population [1] (N=449)	High-IQ (N=28)	High creative [2] (N=24)
1	2	3	4
IQ:			
Mean	132. 00	150. 00**	127. 00
Standard deviation	15. 07	6. 64	10. 58
School achievement:			
Mean	49. 91	55. 00**	56. 27**
Standard deviation	7. 36	5. 95	7. 90
Teacher preference ratings:			
Mean	10. 23	11. 20*	10. 54
Standard deviation	3. 64	1. 56	1. 95
Need for achievement (T.-scores):			
Mean	49. 81	49. 00	50. 04
Standard deviation	9. 49	7. 97	8. 39

[1] For purposes of comparison the scores of each experimental group were extracted from the total population before t-tests were computed.

[2] Two subjects were omitted from the sample of 26 high creatives because they failed to furnish data on the McClelland N-Achievement instrument.

* Significant at the 0.01 level.

**Significant at the 0.001 level.

TABLE 2.—Categories of fantasy productions of highly creative and highly intelligent groups

Content-analysis categories	Group				X[3]
	High creativity[1] (N=24)		High IQ (N=28)		
	Frequency[2]	Percent	Frequency[2]	Percent	
1	2	3	4	5	6
Stimulus-free theme	18	75	11	39	[3] 5. 31*
Unexpected ending	22	92	17	61	5. 05*
Presence of humor	17	71	7	25	9. 16**
Presence of incongruity	17	71	10	36	5. 06*
Presence of violence	18	75	13	46	3. 27
Playful attitude toward theme	21	89	9	32	14. 04**

[1] Two subjects were omitted from the sample of 26 High Creatives because they failed to furnish data on the McClelland N-Achievement instrument.

[2] Numbers in the frequency column represent the subjects whose fantasy productions fit the corresponding categories.

[3] Yates correction was applied in the computation of chi-squares.

*Significant at the 0.05 level.
**Significant at the 0.01 level.

the fantasy productions of the creative group were clearly dissimilar from those of the population as a whole, so much so that the "blind" sorting of 47 creative and noncreative protocols resulted in only 7 misplacements. (5) A more systematic differentiation of the protocols using content-analysis procedures showed that the two experimental groups differed significantly in their fantasy responses. The creative group made greater use of stimulus-free themes, unexpected endings, humor, incongruities, and playfulness.

Here, for example, are typical stories by highly intelligent and by highly creative subjects to two of the McClelland stimulus-pictures.

One picture-stimulus was perceived most often as a man in an airplane reclining seat returning from a business trip or conference. A high-IQ subject gave the following story: "Mr. Smith is on his way home from a successful business trip. He is very happy and he is thinking about his wonderful family and how glad he will be to see them again. He can picture it, about an hour from now, his plane landing at the airport and Mrs. Smith and their three children all there welcoming him home again." A high-creative subject wrote this story: "This man is flying back from Reno where he has just won a divorce from his wife. He couldn't stand to live with her anymore, he told the judge, because she wore so much cold cream on her face at night that her head would skid across the pillow and hit him in the head. He is now contemplating a new skid-proof face cream."

This story was in response to a stimulus-picture usually perceived as a man working late (or very early) in an office:

> **The high IQ student:** "There's ambitious Bob, down at the office at 6:30 in the morning. Every morning it's the same. He's trying to show his boss how energetic he is. Now, thinks Bob, maybe the boss will give me a raise for all my extra work. The trouble is that Bob has been doing this for the last three years, and the boss still hasn't given him a raise. He'll come in at 9:00, not even noticing that Bob had been there so long, and poor Bob won't get his raise."
>
> **The high-creative student:** "This man has just broken into this office of a new cereal company. He is a private-eye employed by a competitor firm to find out the formula that makes the cereal bend, sag and sway. After a thorough search of the office he comes upon what he thinks is the correct formula. He is now copying it. It turns out that it is the wrong formula and the competitor's factory blows up. Poetic justice!"

These stories were written in group sessions with often more than a hundred adolescents in the same room and a maximum writing time four minutes per story. "Skidproof face cream!" "Cereal that will bend, sag, and sway!" It seems that the ability to restructure stereotyped objects with ease and rapidity—almost "naturally"—is the characteristic mark of the high creative as against the high IQ subjects in this investigation.

Discussion and Summary

The essence of creativity appears to lie in the ability to produce new forms, to conjoin elements that are customarily thought of as independent or dissimilar; not merely the propensity for seeing the bizarre but rather the aptitude for achieving new meanings having social value. Guilford[5] has given the name "divergent" to intellectual activities expressing this ability, in contrast to activities which he calls "convergent." It is chiefly the latter type of performance that is tapped by conventional measures of intelligence. Whether or not one adopts the terminology of Guilford, there is little doubt that the ability required for what has been called "divergent" intellectual activity is not well sampled by the usual intelligence-test items, and accordingly this ability contributes but little to the IQ score. In these terms, the high IQ subjects of the experimental groups are superior in "convergent" intellectual performance and the high-creativity subjects in "divergent" intellectual performance.

The evidence of this report centers attention on the difference in the fantasy quality of the two groups. It is tentatively concluded that a *sine qua non* of creative functioning is a rich and available fantasy life.

---

[5] Guilford, J. P. *A Revised Structure of Intellect.* Reports from the Psychological Laboratory, No. 19, Los Angeles, University of Southern California, April 1957.

The difference between the person with a convergent and the person with a divergent orientation toward problem solving appears to be that the former focuses on the stimulus, since he seeks objective precision of the sort others will recognize as "right" and therefore successful by conventional standards. In effect, he may be said to intellectualize the ambiguities presented by a problem in an effort to find the right answer. The latter detaches himself from the stimulus, since he prefers subjective playfulness that he himself will find "delightful." In effect, he may be said to personalize the ambiguities presented by a problem in an effort to attain an enjoyment which may or may not be shared with others. If the former "latches on" *to* a stimulus, the latter "takes off" *from* a stimulus.

The search for variables differentiating the "creative" from the "intelligent" person is the focus of much theoretical and practical concern. This study examined the achievement motives, fantasy productions, school performance, and teacher preferences of two types of adolescents, those exceptionally high in creativity but not in IQ and those exceptionally high in IQ but not in creativity. The results indicated that: (1) Despite striking differences in IQ, the two groups were equally superior in school achievement; (2) The intelligent subjects rather than the creative ones were preferred by teachers; (3) There were no differences in N-Achievement; (4) There were significant differences in fantasy productions, the creative group using more stimulus-free, humorous, and playful themes.

OCCUPATIONAL CHOICE AND COGNITIVE FUNCTIONING

A study of the career aspirations of highly intelligent and of highly creative adolescents

The relationship between an individual's cognitive style and his personal orientation to the world is of central importance to the understanding of both cognitive functioning and social behavior. This study investigates the relationship between cognition, as defined by performance on intellective tasks, and personal orientation, as defined by long-term occupational choice and career aspiration.

Problem

The purpose of the investigation is two-fold: At the substantive level, to determine the occupational preferences of the two groups of adolescents described in the previous section; at the theoretical level, to ascertain the relationship between types of cognition and types of career aspiration. Two guiding empirical questions were posed: (1) What is the nature of the long-term occupational goals of the two groups? (2) To what extent do perceived "teacher standards" and the criterion "success in adult life" enter as motives in the aspirations of the two groups?

Subjects, Instruments, and Procedures

The experimental groups were the 26 highly creative and the 28 highly intelligent adolescents previously described. Four instruments were used to obtain the data:

A DIRECT SENTENCE COMPLETION TEST. Among the 60 items comprising this test were such career-preference items as: "When I grow up I want to become a . . . .," "If the choice of a permanent occupation were left up to me, I would choose . . . .," "The work that has the greatest appeal to me is . . . .," "I always wanted to be a . . . ." The student was required to respond directly to these items by completing each stub so as to reflect his own preferences. The responses of the two groups were analyzed for the number and kind of occupations mentioned.

AN INDIRECT SENTENCE COMPLETION TEST. This test was parallel to the direct test, except that the sentence stubs were written in the third person and used boys' names for the male subjects and girls' names for the female subjects: e.g. "When Stan [Jean] grows up, he [she], wants to become a . . . .," etc. The subject was required to respond "projectively" to the items by completing the stubs as a verbal speed test. The responses of the two groups were analyzed for the number and kind of occupations mentioned.

A PARENT QUESTIONNAIRE. This instrument required the parents of the students to respond to two questions regarding their children's occupational goals as follows: "Has the pupil expressed interest in a particular career?" "If yes, specify . . . ." The responses from the parents of the two groups were analyzed for the number and kind of occupations mentioned.

AN OUTSTANDING TRAITS TEST. This was the same test described in detail in the first section. It contained descriptions of 13 children, each description exemplifying some desirable personal quality or trait. The subjects were required to rank the 13 hypothetical children in 3 ways: (1) On the degree to which they would like to be like them; (2) On the degree to which they believed teachers would like them; (3) On the degree to which they believed people with these qualities would succeed in adult life. The rankings given by the two groups within each category and the relationships among the rankings for the different categories were analyzed.

Summary of Results

1. Differences between the two groups appeared in both the *quantity* and *quality* of occupational goals. The *quantity* of occupational possibilities mentioned is significantly greater for the high creatives than

for the high IQ's, the latter group having mentioned an average of 1.82 different occupations on the Direct Sentence Completion Test and 3.57 on the Indirect Test, the former group an average of 2.61 and 5.00 on the respective tests. The *quality* of the different occupations mentioned as possibilities is also significantly different for the two groups. When the occupations mentioned were divided into conventional (lawyer, doctor, professor) and unconventional (adventurer, inventor, writer) categories, it was found that the high creatives mentioned a significantly greater proportion of unconventional occupations than did the high IQ's. For example, on the Direct Sentence Completion Test, only 18 percent of the high IQ's mentioned any unconventional occupation, whereas 62 percent of the high creatives mentioned at least one such occupation as a possibility. (See table 3.)[*]

The findings of the reports of the adolescents are supported by the data from the Parent Questionnaire. Parents of 24 of the high-IQ

TABLE 3.—Number and type of occupations mentioned by the experimental groups on direct and indirect sentence-completion tests

Type of sentence-completion test and group	Number of occupations mentioned			Unusual occupations	
	Total	X	Standard deviation	Number mentioned	Number of students mentioning
1	2	3	4	5	6
Direct:					
High-IQ (N=28)	51	1. 82*	1. 09	6	5**
High-creative (N=26)	68	2. 61*	1. 41	24	16**
Indirect:					
High-IQ (N=28)	100	3. 57**	1. 81	12	10*
High-creative (N=26)	130	5. 00**	1. 80	29	17*

t used to test differences between means in column 3.
X^2 used to test differences between frequencies in column 6.

*Significant at 0.05 level.
**Significant at 0.01 level.

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[*] It is interesting to note that mention of unusual occupations by the high-creatives occurs with equal frequency in their "direct" and their "projective" responses, while for the high-IQ's mention of unusual occupations is much more likely to occur in their "projective" responses than in their "direct" responses. This difference supports the proposition held by Kubie (*Neurotic Disturbance and the Creative Process*, University of Kansas Press, 1958) pointing to the "flux" or movement of preconscious material into the consciousness of the creative person, and the relative restriction of such movement in the more highly intellectualized person.

children and 24 of the high-creativity children replied to the questionnaire. Parents of 16 high-IQ and 20 high-creativity children reported that their children had expressed an interest in some career. What is most noteworthy in these reports is that 12 (75 percent) of the parents of high-IQ children mentioned occupations in but five career categories: engineering and architecture, science, medicine, law, and teaching; only 7 (35 percent) of the parents of high-creativity children mention career choices exclusively in these five categories. Instead, the parents of high-creativity children tended to mention such rather unconventional occupations as "veterinary" or "entertainer," such unresolved combinations as "law or music," "teaching or art," and such expressive professions as "writing" or "dancing." None of the latter were mentioned as possibilities by the parents of the high-IQ children. A summary of the data is presented in table 4.

TABLE 4.—Career choices mentioned by parents of high-IQ and high-creative adolescents

Career choice mentioned	Parents of—	
	High-IQ's (N=16)	High-creatives (N=20)
A single major profession such as engineering or architecture, law, medicine, teaching	12	7
Other professions and occupations or several career choices	4	13

$X^2=5.71$.
$p<0.02$.

With respect to the *quantity* of occupations considered, depending on one's point of view, one might say that the high-creativity adolescents are more "diffuse" in occupational goals than the high-IQ adolescents, or that they are more able and willing to deal with a greater range of career possibilities. As for the *quality* of occupations considered, again depending on one's point of view, one might say that the high-creativity adolescents are either more "eccentric" in their occupational goals or more able and willing to deal with career risks; that is, to take liberties with accepted standards of adult success.

2. Data with respect to the second empirical question, the "success" orientation of the two groups, were obtained from the Outstanding Traits Test and provide further insight into the career aspirations of the high-IQ and high-creativity adolescents.

The high-IQ's ranked the qualities in which they would like to be outstanding in the following order:[7] (1) Character, (2) emotional stability, (3) goal-directedness, (4) creativity, (5) wide range of interests, (6) high marks, (7) IQ, and (8) sense of humor. The high creatives ranked the qualities in the following order: (1) emotional stability, (2) sense of humor, (3) character, (4.5) wide range of interests, (4.5) goal-directedness, (6) creativity, (7) high marks, and (8) IQ. Most noteworthy here was the extraordinarily high ranking given by the high-creativity group to "sense of humor," a ranking which not only distinguishes them from the high-IQ group (who ranked it last) but from all groups to which the test had been given.

The most relevant and striking differences, however, between the two groups in the context of the present inquiry are observed in the relationship of the qualities they want for themselves, the qualities they believe lead to adult success, and the qualities they believe teachers favor. For the high-IQ group, the rank-order correlation between the qualities they would like to have themselves and the qualities they believe make for success in adult life is 0.81; for the high-creativity group, it is 0.10. The rank-order correlation between the qualities the high-IQ group would like to have and the qualities they believe teachers favor is 0.67; for the high-creativity group, it is −0.25. (See table 5.)

TABLE 5.—Rank order correlations among subsections of the Outstanding Traits Test, for high-IQ and high-creative students

Components of correlation	Students	
	High-IQ (N=28)	High-creative (N=26)
Personal traits believed "predictive of success" and "favored by teachers"	0. 62	0. 59
Personal traits "preferred for oneself" and "believed predictive of adult success"	. 81	. 10
Personal traits "preferred for oneself" and "believed favored by teachers"	. 67	−. 25

In effect, the high-IQ adolescent wants the qualities he believes make for adult success and qualities similar to those he believes teachers like; the high-creative adolescent favors personal qualities which have no relationship to those he believes make for adult success and are in some ways the reverse of those he believes his teachers favor. The high-creativity adolescents are thus more "rebellious" or more "autonomous" than the high-IQ adolescents with respect to adult standards of success, depending on one's point of view, and the high-IQ adolescents are more "compliant" or more "realistic." In any case, it seems clear that there is a systematic relationship between types of cognitive functioning and types of career aspiration. The high-IQ and the high-creativity groups are characterized by differences in their career aspirations: differences all the more basic since the school achievement of the two groups as measured by standardized verbal and numerical subject-matter tests was the same.

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[7] The entire population of the school, almost without exception, ranked "social skills" first as the quality in which they would like to be outstanding, and "athletics," "good-looks," "high energy level," and "health" last. In view of this very high agreement, the responses were re-ranked to omit the uniformly-ranked qualities. The findings reported here are on the re-ranked data.

Discussion

Several existing conceptual formulations may be cited to account for the present data. Guilford's factors of convergent and divergent thinking are highly relevant.[8]

> "In tests of convergent thinking there is almost always one conclusion or answer that is regarded as unique, and thinking is to be channeled or controlled in the direction of that answer. . . . In divergent thinking, on the other hand, there is much searching about or going off in various directions . . . Divergent thinking . . . is characterized as being less goal-bound. There is freedom to go off in different directions . . . . Rejecting the old solution and striking out in some new direction is necessary, and the resourceful organism will probably succeed."

In this sense, the high-IQ adolescents tend to favor "convergent" modes of problem-solving, and the high-creativity adolescents tend to favor "divergent" modes of problem-solving, whether in the cognitive function represented by performance on the intelligence and creativity measures, or in the personal-social function represented by occupational and career choice.

In the context of motivational theory, Maslow's formulations of defense and growth are similarly relevant to the present issues. He writes:[9]

> "Every human being has both sets of forces within him. One set clings to safety and defensiveness out of fear, tending to regress, hanging on to the past . . . afraid to take chances, afraid to jeopardize what he already has, afraid of independence, freedom, separation. The other set of forces impels him forward toward wholeness of self and uniqueness of self, toward full functioning of all his capacities, toward confidence in the face of the external world at the same time that he can accept his deepest, real, uncon-

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[8] Guilford, op. cit., p. 6, 7, 9.

[9] Maslow, A. H., Defense and Growth, *Merrill-Palmer Quarterly*, 3:37–38, No. 1, fall 1956.

> scious Self . . . This basic dilemma or conflict between the defensive forces and the growth trends I conceive to be existential, imbedded in the deepest nature of the human being, now and forever into the future . . .
>
> "Therefore we can consider the process of healthy growth to be a never-ending series of free choice situations, confronting each individual at every point throughout his life, in which he must choose between the delights of safety and growth, dependence and independence . . . Safety has both anxieties and delights; growth has both anxieties and delights."

In this context, the high-IQ adolescent may be seen as preferring the anxieties and delights of safety, the high-creativity adolescent the anxieties and delights of growth.

It seems that the essence of the performance of the high-creativity adolescents lay in their ability to produce new forms, to risk conjoining elements that are customarily thought of as independent and dissimilar, to "go off in new directions." The creative adolescent seemed to possess the need to free himself from the usual, to diverge from the customary behavior; he seemed to enjoy the risk and uncertainty of the unknown. In contrast, the high-IQ adolescent seemed to possess to a high degree the ability and the need to focus on the usual and to be "channeled and controlled" in the direction of the right answers, the socially accepted solution. He appeared to shy away from the risk and uncertainty of the unknown and to seek the safety and security of the already known.

Moreover, the differences between the high-IQ's and the high-creatives are not restricted to their intellectual performance or to their occupational choice. The data concerning both cognitively-oriented and socially-oriented behavior are of a piece; the characteristics that describe one describe the other. The high-IQ's tended to converge upon stereotyped meanings, to perceive personal success by conventional standards, to move toward the model provided by teachers, to seek out careers that conform to what is expected of them. The high-creatives tended to diverge from stereotyped meanings, to move away from the model provided by teachers, to seek out careers that do not conform to what is expected of them. It seems that the outstanding feature of all the data is the consistency of the cognitive (as defined by performance on intellective tasks) and the personal-social (as defined by occupational choice and career aspiration) aspects of behavior.

Turning to the educational implications of the research projects reported in these sections and, indeed, of the great bulk of research dealing with creativity, there seems to be little doubt as to which of these two personal orientations is more acceptable in the majority of our social institutions. Guilford[10] who clearly perceived this bias, says that education "has emphasized abilities in the areas of convergent thinking and evaluation, often at the expense of development in the area of divergent thinking. We have attempted to teach students how to arrive at 'correct' answers that our civilization has taught us are correct. This is convergent thinking. . . . Outside the arts we have generally discouraged the development of divergent thinking abilities, unintentionally but effectively."

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[10] Guilford, op. cit. p. 19.

Failure to distinguish between convergent and divergent talent in our schools may have serious consequences for the future of our society. Both kinds of talent are sufficiently important to warrant attention in educational theory and practice, and it is unwise to think of divergent fantasy as simply rebellious, rather than germinal, or unconventional career choice as invariably unrealistic rather than courageous.

It is hoped that a multidimensional approach to the study of giftedness along the lines attempted in these studies will bring about an increased appreciation of the motivational and cognitive variability of children.

Identification and Classroom Behavior of Gifted Elementary School Children

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TESTS FOR IDENTIFYING GIFTED ELEMENTARY SCHOOL CHILDREN

For many years Hunter College has operated elementary and secondary demonstration schools for the education of the intellectually gifted. Children are selected for admission to the schools by examination and interview.

For the Hunter College Elementary School, the admissions examination has been the 1937 edition of the Stanford-Binet Scales. Only the children who obtain extremely high scores on this test are considered for admission. Studies of the factorial composition of the items included in the Stanford-Binet Scales have indicated that they are heavily weighted with verbal reasoning ability. In practice, then, children selected for admission as "intellectually gifted" have high IQ's as measured by this test of general intelligence and are, therefore, outstanding with respect to verbal reasoning ability.

This situation leads to several questions: (1) Are there intellectual abilities either independent of or only loosely related to verbal-reasoning ability in which some children as young as 4½ to 5½ years of age might prove to be outstanding regardless of their ability in verbal reasoning? (2) Can such children be identified by means of suitable tests? (3) What differences can be observed in the classroom behavior of first-grade children selected as outstanding in at least one of several loosely related intellectual abilities? The present study was undertaken to answer these questions.

Basic Skills Investigated

Of the basic skills that have been found repeatedly in the analysis of human mental ability, four (space conceptualization, vocabulary, number ability, and reasoning) are of particular use in predicting performance in activities commonly regarded as intellectual.

A number of other clusters of skills important in human mental life have been defined and measured successfully. Although the others have not shown evidence of being as essential as the four cited, a measure of scientific knowledge was included as the fifth area of intellectual ability owing to the aroused interest in scientific training that followed the launching of Sputnik I.

The five basic skills therefore investigated in this study were:

Space conceptualization. This refers to a cluster of skills related to judging spatial relationships and sizes of objects, and in visualizing their movements in space. Space conceptualization is involved in courses such as geometry, trigonometry, shop mechanics, and drafting. In addition, it is important in elementary-school activities such as practical arts and drawing, as well as in occupations such as auto mechanics and engineering.

Vocabulary. This skill is defined as memory for word meanings in which reasoning elements, such as those required by verbal analogies, are reduced to a minimum. Knowledge of word meanings has long been regarded as the best single predictor of success in academic courses, especially in the language and social-science fields. It is involved to a marked degree in the work of all professions and most of the semiprofessional areas.

Number ability. This is defined as skill in memory and use of the fundamental combinations in addition, subtraction, multiplication, and division. It is of great importance in arithmetic in elementary schools and mathematics in secondary schools. In addition, it influences performance in science courses such as physics and chemistry and in some commercial courses.

Reasoning. This involves the ability to formulate concepts, to weave together ideas and concepts, and to draw conclusions and inferences from them. It is, almost by definition, the central element of aptitude for intellectual activities and therefore is of primary importance in all academic fields and in most vocations.

Scientific knowledge. This area is defined as the knowledge of scientific principles and information.

Investigations of the interrelationship of various skills have yielded results that are not wholly consistent: for example, a number of studies (Anastasi and Foley,[1] Balinsky,[2] Burt,[3] Clark,[4] and Garrett[5]) have led some psychologists to conclude that mental functions become more differentiated as age increases. Other studies (Peel and Graham,[6] Swineford,[7] [8] and Vernon [9]) have led some psychologists to the opposite conclusion. This point is one of special interest in connection with this study since data pertaining to the intercorrelations of certain mental skills in children aged from about 4½ to 6½ years have been obtained. In general, the data suggest that the mental skills measured are markedly differentiated in children as young as 4½ years of age and that there is even greater differentiation a year later.

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[1] Anastasi, A., *and* Foley, J. P., *Differential Psychology*. New York: Macmillan, 1949. (P. 1–610, 1937 edition.)

[2] Balinsky, B. An analysis of the mental factors of various age groups from 9 to 60. *Genetic Psychology Monographs*, 23: 191–234, February 1941.

[3] Burt, C., The differential of intellectual ability. *British Journal of Educational Psychology*, 24: 76–90, June 1954.

[4] Clark, M. P., Changes in primary mental abilities with age. *Archives of Psychology*, May 1944, No. 291, 30 p.

[5] Garrett, H., A developmental theory of intelligence. *The American Psychologist*, 1: 372-378, September 1946.

Basic Requirements of the Tests

In designing tests of the five areas to be measured, two factors were of controlling importance:

1. The tests were to be administered to children applying for admission to the first-grade class in Hunter College Elementary School. This meant that children between the ages of about 4 years, 3 months and 5 years, 3 months would be tested.
2. Of the applicants tested, there would be places in the first grade for only a few of the highest-scoring children.

Given these facts, it appeared necessary to construct tests that could be administered individually, like the Stanford-Binet Scales, in such a way as to allow for variations in the examinee's attitude and to provide the motivation that a skilled examiner can engender through personal contact. Reading on the part of the examinee would not be required. It was also necessary to construct tests that would permit differentiation among examinees whose intellectual level is high compared to the average at their ages.

In addition to these basic requirements, power tests were used that included a wide variety of activities of interest to young children. The investigators wished to reduce the intercorrelations of the five tests by eliminating the overlapping of test variance accounted for by the use of difficult words in the directions, by the method of recording responses, and by the effect of personality traits on test performance.

Development of the Tests

In September 1957 construction was begun of tests which were to be administered in the spring of 1958 to applicants for admission to a special first-grade class of 30 pupils in the Hunter College Elementary School. Five preliminary tests, one for each of the five areas, were administered to 263 applicants. Statistical data were obtained for analytical purposes.

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[6] Peel, E. A., *and* Graham, D., The differentiation of ability in primary school children. *Research Review*, 31–34, 40–48, 1952.

[7] Swineford, F., A study in factor analysis: The nature of general, verbal, and spatial bifactors. *Supplemental Educational Monographs*, 67: 1–71, November 1948.

[8] ——— General, verbal, and spatial bifactors after 3 years. *Journal of Educational Psychology*, 40: 353–360, October 1949.

[9] Vernon, P. E., *The Structure of Human Abilities*. London: Methuen, 1950, p. 1–153.

Information obtained from the administration of the preliminary tests was used in constructing two parallel forms of much longer tests in each of the five areas selected for measurement. These tests constituted the experimental forms for two parallel forms of the Hunter Aptitude Scales for Gifted Children. As in the case of the preliminary tests, these are power tests; they were administered individually and required no reading or writing on the part of the examinee. The types of items and the number of scorable exercises in each of the experimental forms AX and BX were as follows:

Type of test	*Number of items*
SPACE	65
Object completion	
Perspective	
Hidden pictures	
Cubes	
Roll-up	
Jigsaw puzzles	
Judging sizes	
Estimating path	
NUMBER	65
Addition	
Subtraction	
Multiplication	
Division	
REASONING	53
Picture analogies	
Verbal analogies	
Picture arrangement	
Planning (jump peg)	
SCIENCE	50
VOCABULARY	97
Picture recognition	
Definitions	
Total	330

Form AX was administered in the spring of 1959 to 57 and form BX to 53 of the original 263 applicants for admission to the first-grade of Hunter College Elementary School. All of the applicants were born in 1954; 51 were boys and 59 girls. The tests were given in three sessions for each applicant by one of two examiners employed for the purpose.

The reliability coefficients and intercorrelations of the five tests were obtained separately for form AX and form BX. When these were found to be insignificantly different at the 0.05 level, data for the two forms were combined to obtain the within-groups standard deviations and reliability coefficients shown in table 1.[10]

TABLE 1.—Within-group intercorrelations and reliability coefficients of tests of mental characteristics of gifted children applying for admission to Hunter College Elementary School

[N=110; between age 4 years, 3 months and 5 years, 3 months]

Hunter aptitude scales	Area tested				
	Space	Vocabulary	Number	Reasoning	Science
1	2	3	4	5	6
Space	0. 69	0. 43	0. 31	0. 56	0. 54
Vocabulary		. 93	. 33	. 45	. 64
Number			. 97	. 32	. 29
Reasoning				. 94	. 45
Science					. 79
Mean	24. 96	35. 16	5. 56	46. 64	17. 17
Standard deviation	5. 89	10. 89	8. 82	17. 11	5. 73

NOTE: Reliability coefficients are in the diagonal cells. These are split-half coefficients corrected by Angoff's formula No. 16. (Angoff, W. H. Test reliability and effective test length. *Psychometrika*, 1953, 18, 1-14). The tests were not speeded; every examinee had a chance to try every item.

In table 2 the intercorrelations of the five tests in each form are shown after correction for attenuation. Note that the correlation of the number and reasoning scores is only 0.34. Some of the implications of the data in table 2 are made explicit in table 3, which shows the percent of the nonchance variance of each test that is estimated to be unique in the Hunter Aptitude Scales for Gifted Children.

TABLE 2.—Within-group intercorrelations found in table 1 corrected for attenuation (N=110)

Area tested	Vocabulary	Number	Reasoning	Science
1	2	3	4	5
Space	0. 54	0. 38	0. 70	0. 73
Vocabulary		. 35	. 48	. 74
Number			. 34	. 33
Reasoning				. 52

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[10] The tests were constructed in the Hunter College Educational Clinic by Frederick B. Davis and Gordon Fifer, assisted by Arthur Appel, Gerald S. Lesser, Lucille Nahemow, and Mary B. Willis. The coefficients reported are based on administration of *one* form of the tests to each applicant, *not* on administration of both forms of the tests to any one applicant.

TABLE 3.—Unique nonchance variance of 5 tests of mental characteristics of the Hunter aptitude scales (forms AX and BX) for gifted children

Test area	Percent of test nonchance variance estimated to be unique
Space	31
Vocabulary	42
Number	82
Reasoning	48
Science	29

Conclusions

Answers to two of the questions posed at the beginning of this section are evident. First, there are at least five intellectual abilities which are only loosely related to one another but which can be accurately measured in gifted children as young as 4 to 5 years of age. Second, children gifted in one or more of these intellectual abilities can be identified.

CLASSROOM BEHAVIOR AND PERFORMANCE

Experimental and Control Classes

The experimental class was selected on the basis of two major requirements: (1) Those who scored in the top seven on each of the five test areas of the preliminary screening and selection tests, and (2) the operating requirements of the Hunter College Elementary School.

In regard to the first criterion subjects were chosen on the basis of only one high score. Therefore, in some instances (some were in the high seven in more than one area) it was necessary to go farther down than the rank of seven to include subjects in each of the five areas. The requirements of the school also made it necessary in some instances to go below the seventh ranked subject in the selection. The requirements of the school were :(1) Children needed to be socially and emotionally mature enough, as judged through a small group-interview technique, to profit from class activities; (2) there must be an equal number of boys and girls, and (3) no child could be included who had taken the Stanford-Binet Scales prior to the Hunter Tests.

The control class was composed of children who met the requirements for admission to the Hunter College Elementary School.

All the children who were in the experimental group were given the Stanford-Binet Scales by qualified examiners following the administration of the experimental tests (June 1958). The test scores used in the admission of children to the control class were IQ's derived from the Stanford-Binet Scales. These were administered in May 1956, 1957, and 1958 by qualified psychologists of the parents' choice. The scores were used as one of the admission criteria for enrollment in the Hunter College Elementary School. The control class mean IQ was 21.22 points higher than the experimental class mean IQ, a difference that was significant at a high level. (See table 4.) If this difference reflected a true difference between the general mental ability of children in the experimental and control groups, one would expect the control group to obtain significantly higher mean scores on other mental ability tests.

TABLE 4.—Mean scores of experimental and control classes on the Stanford-Binet Scales (form L) [1]

Class	Number of children	Stanford-Binet intelligence quotient
Experimental	27	131. 70
Control	26	152. 92
t (experimental mean *vs.* control mean)		[2] 6. 41

[1] All experimental children received the Stanford-Binet Intelligence Test in June 1958; those control subjects entering Hunter College Elementary School at nursery-school age took the Stanford-Binet in May 1956; other control children took the test in May 1957 or May 1958.

[2] $p<0.01$ (2-tailed test).

As seen in table 5, the mean scores of the same children are shown on the SRA Primary Mental Abilities Tests (ages 5 to 7) in spatial, verbal, and numerical areas and on the selection tests in reasoning and science. Instead of being considerably lower than the control-group mean, however, the experimental-group mean was higher in every instance; the difference reached statistical significance at better than the 0.05 level for a two-tailed test of the null hypothesis in the case of the science test.

Although the correlations of the Stanford-Binet IQ's with the other aptitude-test scores is not perfect, they are moderately high. Therefore, the data in tables 6 and 7 do not make it reasonable to ascribe the difference of 21.22 IQ points between the mean IQ's of the experimental and control classes to a true difference in favor of the control class.

The explanation may be related to the purpose for which the Stanford-Binet IQ's were obtained for the pupils in each group. In the case of the control group it was known by the parents and psychometrists that the IQ's would have a controlling influence in their admission to the elementary school. The children in the experimental group had already taken the tests to be used for admission before they took the Stanford-Binet Scales, and it was known that the Binet IQ's were not to be used for admission purposes.

Pretesting of Classes

As soon as classes were assembled in the fall of 1958, children in the experimental and control classes (N=27 and 26, respectively) were administered the spatial, verbal, and numerical areas of the SRA Primary Abilities Test (ages 5 to 7). In addition they were administered the reasoning and science areas of the Hunter Preliminary Tests.[11] The resulting scores, as shown in table 5, provided an initial basis for comparison of the experimental and control classes and for comparison of the groups within the experimental class.[12]

TABLE 5.—Mean score of experimental and control classes in tests of 5 mental characteristics

Group	Number of children	Primary mental abilities test			Hunter College preliminary selection test	
		Space	Vocabulary	Number	Reasoning	Science
1	2	3	4	5	6	7
Experimental:						
Space	6	19.16	37.50	17.17	14.33	11.83
Vocabulary	5	14.83	37.50	18.33	14.16	12.17
Number	5	17.60	41.60	22.80	16.20	12.70
Reasoning	5	17.20	40.20	22.00	16.80	17.50
Science	6	16.00	39.00	18.00	14.40	16.50
Total	27	16.67	39.04	19.52	14.85	13.85
Control	26	15.46	37.27	19.42	14.15	11.42
t (experimental vs. control mean)		1.02	1.57	0.10	0.79	[1] 2.28

[1] p<0.05 (2-tailed test).

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[11] Of the 27 experimental children, 7 received the Preliminary Selection Reasoning test in June 1958, 20 in September 1958; 9 received the test in June 1958, 18 in September 1958. Of the 26 control children, 1 received the Preliminary Selection Reasoning test in June 1958, 25 in September 1958; all control children received the Preliminary Selection Science test in September 1958.

[12] All experimental and control children were given the SRA Primary Mental Abilities Test for Ages 5–7 in September 1958.

Experimental Teaching Program

The program for gifted children provided at the Hunter College Elementary School was supplemented with programs of special emphasis in the five areas of mental ability. It was hypothesized that such special programs would increase general participation and productivity in these areas, and that children gifted in a given area would benefit especially from instruction in that area. The daily program at the school called for a 3-hour morning session for the entire class, plus lunch and an additional hour for a different small group each day of the week. For the experimental class this hour was devoted to the special programs. The five or six members of each group met together one afternoon each week.

In order to compare the effect of the special instruction in one area on the children gifted in that area with its effect on children gifted in other areas, the school year was divided into quarters. Each group received special training in its area for half the afternoon period throughout the year. During the other half of the period each group received instruction in a different area each quarter. Thus, each child had four times as much instruction in his own specialty as did the other children; however, each had an identical quarter of instruction in the other four areas.

The morning program was left entirely to the classroom teachers on the assumption that the experimental and control classes would be given similar material following a more or less standard pattern for the school. However, there were between-group differences in teaching techniques; this makes it difficult to assess the effect of the special instruction and to compare the two classes.

The special programs for the experimental class were designed to provide a broader coverage than the morning program and to introduce material not generally taught at this age level. Spatial work, for example, consisted in part of making maps and diagrammatic representations, constructing designs, following diagrams, laying out a city, and Japanese paper-folding.

Activities in the verbal area involved free association with poetry and a chance to write poems, discussion of the dictionary and classes of words, vocabulary building and the construction of dictionaries, development of a story, and practice in the communication of ideas.

The numerical area included familiarization with geometric figures and the concept of fractions, discussion of averages and the combination of numbers to balance groups, discussion of Roman numerals, making clocks, telling time, and the use of an abacus.

Included in the reasoning lessons were verbal and pictorial analogies and similarities, some aspects of formal logic and the use of symbols to express ideas, and picture interpretation.

The group in science had demonstrations and performed simple experiments dealing with air, air pressure, and air currents. Many of these activities were experimental, never previously tried by the classroom teacher; nevertheless, most of them seemed suitable to the group and were mastered by at least a part of the group.

Data Obtained

A set of five achievement tests was constructed. The appropriate test was administered to each experimental group at the completion of each quarter.

An observation code covering all relevant activities of the children was devised. Each class was observed during the morning hours for two 45-minute periods each week. These periods were arranged so that all types of classroom activities were observed.

During the first term, two observers made independent ratings of the morning classes. One of the observers was unaware of the test scores or the group assignment of any child. The degree of rank-order agreement between ratings of the observers is expressed by the following correlation coefficients between their ratings: Spatial area, 0.79; verbal area, 0.88; numerical area, 0.70; reasoning area, 0.78; and science area, 0.97. This reasonably high agreement suggests that the observations were not biased by knowledge of each child's areas of special ability. In addition, when rater differences occurred, there was no consistent bias in favor of the expectations of the observer who had such knowledge.

Every afternoon session of the experimental class was attended by one observer.

At the end of the year the SRA Primary Mental Abilities Test (7 to 11 years) was administered to both classes. This form provides spatial, verbal, numerical, and reasoning scores. Only the non-reading part of the verbal section of the PMA was used.

Experimental forms AX and BX of the Hunter Aptitude Scales for Gifted Children were administered in both classes.

Results

Two general comparisons can be made: (1) The comparison of the groups within the experimental class with respect to the various measures, and (2) the comparison, insofar as it is feasible, of the experimental and control classes. The first will answer the question "Did the selection tests identify children who would benefit especially from specialized instruction?" The second will indicate how this method of selection and instruction compares with more traditional ones.

In dealing with the experimental class, two general kinds of analyses were made. First, the group means were compared. But since there was a great deal of overlapping in the groups, so that a child in a given group would be expected on the basis of his selection-test score in another area to do well in that area, too, correlations between selection and performance scores were also computed in some instances. Since all the analyses are based on small numbers, elaborate tests of significance were not attempted and it is well to consider the findings as suggestive rather than conclusive.

Data relating the achievement tests to the selection procedures are presented in table 6. In all but the science group the expected mean is the highest and, in addition, the appropriate group mean is significantly higher than that of the remainder of the class.

TABLE 6.—Achievement test means for the 5 groups in the Hunter College Elementary School experimental class

Group	Number of children	Area tested				
		Space	Vocabulary	Number	Reasoning	Science
1	2	3	4	5	6	7
Space	6	*8. 50*	8. 25	4. 33	11. 50	5. 58
Vocabulary	6	6. 50	*9. 75*	2. 00	11. 66	6. 08
Number	5	7. 80	8. 50	*6. 60*	13. 00	5. 60
Reasoning	5	7. 20	8. 80	3. 60	*14. 20*	8. 12
Science	5	6. 60	8. 10	2. 40	13. 00	*6. 70*
t (italicized mean vs. mean of remainder)		[1] 2. 34	[1] 2. 93	[1] 3. 05	[1] 2. 24	0. 76

[1] $p < 0.05$.

It was hypothesized that special instruction in a given area causes greater learning among the children identified as gifted in that area than among the other children in the experimental class. In general, the relative changes were not large and not consistently as high as hypothesized.

The data indicated the following:

1. Children gifted in space aptitude gained more than the average of the class after exposure to special lessons on space.
2. The children gifted in science aptitude gained slightly more than the other children in the experimental class.

3. Children gifted in verbal aptitude gained considerably more than the average of the class with respect to verbal knowledge.
4. Special numerical lessons resulted in a much greater-than-average gain for the children gifted in space aptitude and a slightly greater-than-average gain for the children gifted in number aptitude when compared with the other groups in the experimental class.
5. Special reasoning lessons resulted in greater-than-average gains in reasoning performance among children gifted in the science and reasoning areas when compared with the other experimental children.
6. Special lessons in science resulted in a poorer relative performance by the children gifted in science and in number aptitude. The greatest relative gain in the area of science was made by the children gifted in the verbal area.

The observational material obtained in the morning sessions was divided into quarters to correspond with the special afternoon programs in order to check for trends and to see if there was any evidence that a particular afternoon program was influencing performance in the general classroom situation. Analyses were made of total number of correct responses made, number of major responses, number of volunteered as opposed to called-on responses, and number of appropriate responses made in a context other than the area of the response (e.g., a relevant numerical response in a spatial discussion). Unusual responses, errors, failure to respond, etc., did not occur frequently enough for statistical treatment and all of the above categories yielded similar results; therefore only one, that for major responses, will be discussed. To help control for differences in willingness to talk and assertiveness among the children, and to take into account the difference in number of responses in the areas, a chi-square analysis was used and obtained frequencies compared with expected frequencies based on the marginal totals.

All the groups, except for the reasoning group, consistently made more responses in their areas than would be expected by chance. Comparison of the data by quarters suggests that there was a relative increase in numerical responses and that science responses occurred most frequently and were distributed most evenly in the third quarter when all groups had had or were having the special science program. Reasoning responses decreased in frequency at the time the special reasoning lessons were being given. The third quarter was the one of greatest productivity. There was a drop in the fourth quarter which may have been a result of the teacher's slowing the pace as the end of the year approached.

The contributions of the groups in the five special afternoon programs for the experimental class were recorded in the same way as those in the morning. The analysis was confined to the quarters in which all groups had comparable instruction. Since in these small groups all had equal opportunity to contribute and were called on if they failed to volunteer, only the mean number of responses per group was used. The selected groups tended to do significantly better than the remainder of the class as a group.

The amount of material from other areas introduced into the special instruction periods was also analyzed by groups. There seeemed to be a tendency for the children to want to discuss "their" subjects even when the structure of the situation did not favor it.

On the basis of mean primary mental abilities (ages 7–11) scores in the four areas of the test, it was found that the selected groups tended to do better than the class as a whole. In this case the verbal group was not significantly above the rest of the class, but as previously mentioned, the selection test in that area apparently measured something different from the PMA. The reasoning group, in contrast to some of the observational data but consistent with the learning-test results, scored significantly above the rest of the group in that area. A possible explanation may be that these children can perform well on a test or in a small group when they are called on frequently but are somewhat withdrawn in a larger group. Scores obtained by the spatial and numerical groups revealed they were doing well in reasoning. This is perhaps not surprising for the numerical group. The spatial group probably benefited by the fact that the reasoning score was based on the figure-grouping portion of the test.

Approximately half the class received form AX and half form BX of the Hunter Aptitude Scales for Gifted Children. Since the mean raw scores differ to some extent for the two forms, scores on all tests in both forms were made comparable before the means presented in table 7 were computed.

Conclusions

The children initially selected as gifted in a given area tended to retain their superiority in that area, but there is only some indication that they may have benefited more by instruction in their own area of competence than did children selected for giftedness in other areas. The groups in the experimental class were not significantly higher in "their" area over the class as a whole. All of these results are based on a relatively small number of children and therefore are suggestive only. Some tentative conclusions are indicated, however. The amount of classroom contributions in their given areas appears to be relatively constant throughout. This may reflect an interest factor added to the ability factor.

However, comparisons among aptitude groups on the four criteria employed (achievement tests, observational records, Primary Mental Abilities scores, and the AX and BX forms of the Hunter Aptitude

Scales for Gifted Children) suggest a moderately successful degree of differentiation of children of diverse aptitudes on the basis of the preliminary forms of the tests used.

TABLE 7.—Mean scores of experimental class in 5 areas tested by Hunter Aptitude Scales for Gifted Children (forms AX and BX)

Experimental class	Number of children	Area tested				
		Space	Vocabulary	Number	Reasoning	Science
Space	6	*59. 0*	58. 0	59. 1	59. 4	59. 0
Vocabulary	6	53. 8	*61. 5*	56. 4	58. 2	60. 6
Number	5	56. 2	56. 6	*64. 2*	61. 3	60. 1
Reasoning	5	59. 9	61. 3	58. 0	*58. 2*	60. 5
Science	5	55. 6	58. 4	53. 4	58. 3	*62. 8*
Total	27	57. 0	59. 3	58. 0	58. 8	60. 5
t (italicized mean vs. mean of remainder)		0. 97	[1] 2. 27	[1] 8. 55	0. 82	1. 22

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[1] $p<0.05$ (2-tailed test). The denominator term in the *t* test was the population estimate of the standard error of measurement of the difference (not the standard error of the difference). Thus, p indicates the probability that the difference between the means of the two groups compared would occur as a chance deviation if the difference between the true means *of these groups* were zero.

Motivation Patterns of Superior High School Students

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PROBLEM

The major purpose of this study is to differentiate between able high- and able low-achieving high school students on a number of nonintellectual variables. A secondary purpose of the study involved hypothesized sex differences.

The independent variable is achievement with relation to ability. This relationship is studied by introducing a number of dependent, nonintellectual variables which, it is believed, will aid in understanding the variability.

The majority of the studies on motivation and achievement have dealt primarily with boys and with a limited range of variables. In this study both boys and girls were included, and a wide range of variables and interrelationships were studied.

A number of researchers have been cognizant of the nonintellectual variables related to success, but the operation of these variables still is not clear. Bray [1] in his monograph *Issues in the Study of Talent* indicated that ". . . neither clinical judgment nor psychological test results have as yet yielded differences that are related to performance."

Anne Roe [2] in a study of American scientists implied the importance of nonintellectual factors in her finding that above a certain level, intelligence is a poor predictor of success. Terman [3] in his study of gifted children also indicated there was a marked difference in successful and less successful groups in their drive to achieve all-around social adjustment. In a study of differential vertical social mobility rates among six ethnic and racial groups, Rosen[4] found that the differences could be accounted for in terms of the differing cultural and psychological orientation of the groups. Using measures of achievement motivation, achievement values, and educational-occupational aspirations for assessing the orientation of the above groups, he found that his hypothesis was supported after the effects of social class were isolated. Havighurst[5] has developed a theory of educational motivation in which he included (1) unconscious need for achievement, (2) valuing achievement, (3) intrinsic motivation, and (4) social motivation. He believed these to be, in conjunction with certain constitutional and health factors, the most important elements of motivation related to achievement among talented youth.

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[1] **Bray, D. W., *Issues in the Study of Talent* New York, King's Crown Press, Columbia University, 1954.**

[2] **Roe, Anne, A Psychological Study of Eminent Psychologists and Anthropologists, and a Comparison with Biological and Physical Scientists. *Psychological Monogrgaphs.* Vol. 67, No. 2, 1953.**

[3] **Terman, Lewis M., and Oden, Melita, *The Gifted Child Grows Up.* Stanford University, Stanford University Press, 1947.**

Some recent research in the area of underachievement has been reported by the Portland Public Schools.[6] As a part of their development program for children of exceptional endowment, they compared 49 high-achieving boys with 49 under-achieving boys. The groups were matched by grade in school, socioeconomic status, and intelligence. Three areas were studied: (1) educational adjustment and vocational outlook, (2) personal and social adjustment, and (3) family relations.

The high-achieving boys were found to have positive attitudes toward school and higher educational-occupational aspirations. The high achievers were found to be somewhat more stable and to be more self-confident. In the area of boy-girl relations, the underachievers appeared to be better adjusted, and they dated more. The underachievers tended to associate with peer cliques which they described as negative toward school. In the area of family relations, the parents of high achievers tended to be somewhat less authoritarian and to have experienced fewer difficulties in bringing up their children. The parents of the high achievers were also more supportive emotionally. Significance levels for differences were not reported.

The above references point out that nonintellectual factors are important determiners in achievement behavior, and among them motivational factors receive the major emphasis.

In 1947 McClelland[7] [8] and associates began research in the area of achievement motivation (N-achievement). In addition to a great deal of information about the achievement motive and related variables, his staff developed a practicable method for measuring achievement motivation. The method calls for a projective (TAT) type test and is scored for achievement thema.

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[4] Rosen, Bernard C., Race Ethnicity and the Achievement-Syndrome. *American Sociological Review*. Vol. 24, No. 1, February 1959.

[5] DeHaan, Robert F., and Havighurst, Robert J., *Educating Gifted Children*. Chicago Ill., The University of Chicago Press, 1957. ch. IX.

[6] Portland Public Schools, Portland, Oreg., *The Gifted Child in Portland*, 1959.

[7] McClelland, David C., Atkinson, John W., Clark, Russell A., and Lowell, Edgar L., *The Achievement Motive*. New York, Appleton-Century-Crofts Inc., 1953.

[8] McClelland, David C., *Report of Committee on Identification of Talent*. New York, Social Science Research Council, 1956.

Rosen[9] pursued the study of achievement motivation in terms of its psychological origin. He studied two different kinds of child-training practices. One was training to do things well (achievement training) and the second was training to do things without help (independence training). The children studied were all boys. Rosen found that high motivation for achievement was in fact positively related to these two kinds of child-training practices. It was found that the mother contributed more to the achievement-training aspect, and although both parents contributed to independence training, the father contributed more. There appears to be a link between early achievement and independence training in the home and the development of need for achievement in boys. Comparable data are not available for girls.

Richard deCharms[10] was curious as to whether the elaborate method of assessing an individual's motivation developed by McClelland was superior to simply asking a subject to describe or rate his own motives. Using a nine-item achievement-values scale, deCharms compared the results of the two methods on a group of male subjects. He found the correlation between the two measures to be positive, but low. He therefore concluded that those who verbalize their achievement desires on his V-scale may have developed such conscious needs later in life, possibly in response to adult pressures for becoming successful. It is believed that the motives assessed by McClelland's method are formed early in life and possibly are less readily available for conscious verbalization.

Two findings by Fred L. Strodtbeck[11] are relevant to this study. In an investigation of family interaction, values, and achievement, he found that overachieving boys scored significantly higher than underachieving boys on needs for achievement and on achievement values. His subjects were Jewish and Italian boys, and his achievement-values instrument (V-scale) was an eight-item values scale designed to assess three aspects of achievement values thought to be related to achievement in America.

The above authors have highlighted some of the important variables related to achievement and have developed some useful instruments for assessing motivational strength and achievement values. They have suggested achievement motivation, achievement values, social adjustment, social status, and educational-occupational goals as non-intellectual factors related to achievement among able youth. In addition, the following variables are of particular interest: (1) Identification with adults whom the student considers important, (2) a number of demographic variables, e.g., number of siblings, hobbies, educational level of parents, etc., and (3) parent attitudes toward child rearing.

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[9] Rosen, Bernard C., and D'Andrade, Roy, *The Psychological Origins of Achievement Motivation* (Reprinted from *Sociometry*, Vol. 22, No. 3, September 1959).

[10] McClelland, David C., *Studies in Motivation*, New York, Appleton-Century-Crofts, Inc., 1955.

[11] McClelland, David C., Baldwin, Alfred L., Bronfenbrenner, Urie, and Strodtbeck, Fred L., *Talent and Society*, Princeton, N. J., D. VanNostrand Company, Inc., 1958.

EDUCATIONAL ACHIEVEMENT RATIONALE

All able students are motivated to achieve in one respect or another; that is, all are working toward adult status and roles within that status which appear to offer satisfaction of their needs. What are the factors which dispose some able students to perceive high educational achievement as a desirable stepping stone to adult status, while others view educational achievement as much less important?

Achievement Rationale for Boys

ACHIEVEMENT MOTIVATION. Achievement motivation was measured by McClelland's (TAT) projective instrument. This type of motivation takes the form of wanting to do one's best at anything one tries. This need for high achievement appears to develop early in life through home training in responsibility and independence, and is brought about by task requirements which help the individual to see the relationship between what he is doing and the necessity for doing it.

PSYCHOLOGICAL HEALTH. Psychological health was measured by the California Psychological Inventory and two instruments, the Who Are They (sociometric) test and the Behavior Description Chart (a teacher-rating instrument) developed by the Quincy Youth Development Commission staff. The psychologically healthy person as compared with an unhealthy person is one whose needs have been met adequately. He is better able to see the relationship between what is required of him and the reason for doing it, since he is relatively free from conflicting needs. He has more available energy for the task at hand than the unhealthy individual. He is better able to distinguish between success or failure on a task and success or failure as a person, because his self-esteem is less at stake.

ACHIEVEMENT VALUES. These were measured by Strodtbeck's V-scale. Some individuals place a higher conscious value on achievement than others. They are interested in getting ahead in the world, and achievement is their means of evaluating progress. The person who sees education as a means to achievement will be motivated to achieve in this area. This type of person will not have as intense a need to do his best as will the one who wants to do his best at anything he tries (as described above), but he will be interested in doing well enough to use the achievement as a steppingstone to something better.

Another set of values regarding achievement behavior is that which reflects the "nose to the grindstone" type of philosophy. This still appears to be rather prevalent in our culture and finds expression in the schools. This type of value is probably not very deep-seated, but is one to which most students have been exposed and one on which many students will score high because they feel that they should hold these values. These values were assessed by deCharm's V-scale.

Educational-occupational goals. These goals were measured through the use of a parent and student interview. Educational and occupational goals are related in that different occupations require different amounts of education. The individual whose occupational aspiration requires higher education generally will be a higher achiever than one whose occupational goal does not require it.

Nonscholastic task orientation. Evidence to this point was obtained from questions on the parent interview. There is a difference in the number of self-selected tasks engaged in by children. The high achievers in general will be found pursuing more nonrequired, academically related hobbies.

Socioeconomic status. The status measure was the Index of Status Characteristics developed by Lloyd Warner and collaborators.[12] Higher socioeconomic groups in general hold higher expectations for their children than do lower socioeconomic groups. They also have more resources and contacts with which to insure that their children get the best possible advantages. However, some lower middle-class and upper lower-class parents view education as a means to upward mobility; where this is true the parents will have children who are motivated to achieve. The advantages, however, are with the higher status groups, and it was predicted that their children would be higher achievers than the lower-status children.

Adult identification. Degree of adult identification was determined from questions answered during the student interview. Identification with an adult is a tentative formulation of the self in terms of an adult role. If the child identifies with a parent of the same sex, and if this parent values educational achievement, the child should be able to achieve with a minimum of conflict.

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[12] Warner, William Lloyd, *Social Class in America, a manual of procedures for the measurement of social status*, Science Research Associates, 1949.

PARENT ATTITUDES TOWARD CHILD REARING. These attitudes were measured by the Parental Attitudes Research Instrument (PARI). Some parent attitudes appear to influence the child to do his best, while other attitudes seem to hold a child back. The attitudes of parents are communicated to the child via interaction and therefore are difficult to assess. It was believed, however, that adequate measures could be obtained regarding gross attitudinal dimensions, and it was predicted there would be a relation between parental attitudes toward child rearing and achievement. It was expected that parents who encourage self-expression, who value equality, and who hold democratic attitudes toward children, would have high-achieving children.

SEX AND ACHIEVEMENT. Since achievement studies have for the most part included only male subjects, there is little in the way of achievement theory for girls. As this study progressed, it became apparent that the pattern of achievement for girls is different from that of boys, and a partial theory for girls has been developed.

Achievement Rationale for Girls

The motivational patterns begin to differ early in life. Girls are most commonly expected to be conformists, while boys are expected to be more independent. Girls are supervised more closely in their early play, are kept closer to their homes, and are rewarded for being ladylike. Their dating activities are more closely scrutinized by parents. Their choice of an adult role or life goal is much more circumscribed, even today, while the boy has a wider choice of adult roles. Schools are also an important part of the emphasis on conformity. Girls, more schooled in conformity and rewarded for it, would be expected to adapt more easily to the early school environment and to achieve well in it.

As the girl approaches her adult role, however, academic achievement *per se* tends to become much less relevant in her life. Those who are eager to attain adult status quickly might be expected to marry while in high school or shortly thereafter. Some girls want to attend college and seek a mate with college training. These girls will continue their academic interest longer than the previously mentioned group. Finally, there are girls who continue their academic interest into graduate school. For this latter group there exist strong forces toward academic achievement and postponement or denial of marriage. Such factors might include the educational level of parents, strong parental ambitions centered on the child, feelings of inferiority or unattractiveness, or a highly developed interest or skill. Some personal adjustment problems may be expected within this group.

The different cultural expectations for boys and girls made it necessary that certain items of the rationale presented earlier be revised to account for the educational motivation patterns of girls.

Achievement motivation. In the last years of high school the various forces in a boy's life converge in emphasizing the necessity of academic achievement, so that the boy motivated to get ahead in life will likely be achieving well in school; for girls the forces diverge late in the high school years, with some girls more motivated toward marriage (usually low achievers) and others toward college or employment. Since McClelland's test does not differentiate between these two directions of motivation, it was expected that there would be no difference in the unconscious drive to achieve between the high- and low-achieving girls.

Achievement values. High achieving girls who are willing to postpone marriage for status reasons are expected to be fully aware of placing high value on achievement, either directly through their own efforts or indirectly through marriage. In this aspect, it was predicted that they would be similar to the pattern for boys. Since the high-achieving girl is subjected to greater school and family pressures toward conformity, her feeling of uniqueness is likely impaired; thus it is further postulated that she will value independent accomplishment and reward more highly than her low-achieving, low-aspiring peer who is somewhat more free.

Adjustment and social status. High achievers among both boys and girls are expected to be better adjusted than low achievers and also to be of higher social status. However, failure to achieve has a different effect on boys and girls. The high-status boy who fails to achieve is under considerable threat and stands to lose status and be labeled a failure. A high-status girl does not have to achieve academically to hold her status or be a "success." Therefore, it was predicted that high-status boys who are achieving poorly would measure lower on adjustment than high-status girls who are achieving poorly.

Parent attitudes toward child rearing. Society expects achievement from the boy, and those who succeed have usually been taught responsibility, given independence, and supported emotionally by their parents. From the girl, society expects conformity rather than achievement, and the girl who achieves academically would have parents who place special emphasis on high achievement. Thus it was predicted that high-achieving girls would have mothers who are more authoritarian and controlling than the mothers of low-achieving girls. The opposite was predicted for high-achieving boys.

SUBJECTS AND PROCEDURE

The subjects for this study include the top 30 percent in intellectual ability of the tenth- and twelfth-grade students who were in the Quincy Public Schools during the 1957–58 academic year. These groups were selected because data were available in the Quincy Youth Development Project files.

The top 30 percent were determined by scores on seven group intelligence tests. Three of the seven tests were required on each student, and either the Chicago Primary Mental Abilities (PMA) or the California Mental Maturity (CMM) test was necessary for a student to be included. The girls and boys were then ranked separately on ability at each grade level. This selection procedure provided 109 twelfth-grade students and 120 tenth-grade students.

In order to obtain a score which would describe a student's achievement-ability relationship in a rank score, it was necessary in addition to the ability rank to obtain a grade rank on each student within his respective group. This was accomplished by assigning a weight to both the grade obtained and to the course subject. The grades were weighted as follows: A=4; B=3; C=2; D=1; F=0.[13] The academic subjects (courses of study) were weighted as follows: Solid academic subjects (e.g., history, math, English)=3; somewhat academic (e.g., agriculture, typing, industrial arts)=2; and little academic (e.g., chorus, gym)=1.

The grade weight was then multiplied by the academic weight for each course and the totals added for the student's weighted grade. For example, an "A" in English would received a score of 12 (i.e., 4×3=12). The total weighted grade for each student was ranked within his respective group; thus the ability rank and the grade rank were available for use in deriving an ability-achievement relationship score which could then be ranked for each student.

The achievement-ability relationship was brought out most clearly by weighting the grade rank (RG) more heavily than the ability rank (RA). Therefore, the grade rank was multiplied by 2 and the ability rank substracted from this score. This discrepancy score (2RG–RA) was then ranked for each student within his or her respective sex group and grade level. The foregoing method provided a measure of the achievement-ability relationship for each student which was referred to simply as the achievement rank. The students whose achievement rank placed them above the median for their group, e.g., twelfth-grade girls, were referred to as high achievers and those whose achievement rank fell below the median for their group were the low achievers. Thus four major groups were available for study (twelfth-grade boys and girls, and tenth-grade boys and girls). Each of these groups was divided into high and low achievers (making eight groups) on the basis of achievement rank. This made comparisons possible on achievement, sex, and grade level.

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[13] The academic grades were for the 1956–57 school year.

The above students represent the top talent in their respective grades in a Midwestern river city with a population of approximately 45,000. The community lies within a fertile agricultural region where the major farm products are livestock, corn, beans, and small grains. The industry within the community is diversified and sufficient to provide employment for the majority of the labor force. The wages are higher than in the South and lower than in more industrialized regions. Only part of the labor force is unionized.

HYPOTHESES, ANALYSIS, AND DISCUSSION

The hypotheses[14] are grouped into subcategories which deal with important phases of the student's life. For variables on which sex differences are expected, separate hypotheses are stated for boys and girls.

The statistical tests used in making comparisons between high- and low-achieving groups were *tests of means*, *tests of proportions*, and *analyses of variance*. For the first two of these tests the *standard normal* variable K[15] was used for finding the rejection level of the null hypothesis. The null hypothesis was tested against a 1-sided alternative that there was a difference in a specified direction. Therefore a 1-tailed test of significance was appropriate except as otherwise indicated.

Achievement Motivation and Achievement Values

1. *High-achieving boys will score higher than low-achieving boys on need for achievement as measured by McClelland's TAT.*

Each student told a 4-minute story in response to each of 6 stimulus pictures; the figures in all the pictures were male. The protocols were then scored for achievement thema, and the total score for each student was used. The tests were scored by a psychologist with previous experience in scoring the test. In a sample of 20 students, the rescoring correlated 0.97 with the first scoring; thus the reliability was quite high.

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[14] Hypotheses are numbered, in italics.

[15] Wallis, W. Allen, and Roberts, Harry V., *Statistics: A New Approach.* The Free Press, Glencoe, Ill., 1956, ch. 11.

Tenth-grade high[16] boys scored higher on N-achievement (0.03 level) than their low-achieving peers. (See table 1.) Twelfth-grade high-achieving boys also scored higher on this test than low-achieving boys, but the level was not significant.

Since the high twelfth-grade boys were higher, as predicted, though insignificantly so, the scores for the twelfth-grade boys were looked at in terms of the extremes, with the middle group omitted. For

TABLE 1.—Motivation scores by grade, sex, and achievement (high and low) on McClelland's N-Achievement test, Strodtbeck's V-Scale, and deCharms' V-Scale

Grade and sex of students	Number in group	High achievers		Low achievers		P-value
		Mean	Standard deviation	Mean	Standard deviation	
1	2	3	4	5	6	7
	N-Achievement					
10th Grade:						
Boys	27	5.96	4.97	3.33	4.95	0.03
Girls	33	4.18	3.35	4.70	4.28	[1].64
12th Grade:						
Boys	24	3.75	1.89	2.92	3.46	.15
Girls	29	5.62	4.92	6.21	5.48	[1].66
	Strodtbeck's V-Scale					
10th Grade:						
Boys	27	6.67	1.15	6.11	1.97	.01
Girls	33	6.82	0.64	6.58	1.03	.13
12th Grade:						
Boys	25	6.64	1.12	6.84	.79	[1].46
Girls	29	6.69	.966	6.41	.78	.11
	deCharms' V-Scale					
10th Grade:						
Boys	27	44.00	9.36	41.59	7.93	.15
Girls	33	44.21	7.122	39.82	9.69	.02
12th Grade:						
Boys	25	40.72	7.26	42.96	8.66	[1].32
Girls	29	43.31	10.12	39.28	8.17	.05

[1] Opposite direction from that predicted (2-tailed test).

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[16] *High* and *low* will always refer to *high* and *low achievers* in the group being discussed.

this comparison the twelve highest achieving twelfth-grade boys were compared with the twelve lowest achievers. The difference on this comparison favored the high achievers at the 0.02 significance level.

One other finding relating to hypothesis 1 was revealed. A student could obtain a score on his protocol for "achievement imagery" on the basis of the evaluation of a fantasied performance in comparison to others, a standard of excellence, its uniqueness, or on involvement affecting self-esteem.[17] It was thought that some important differences between the groups of high and low achievers might be revealed by the subscore categories. It was hypothesized that if there were difference between the groups on the subscores they would be greatest within the "involvement" categories and that the degree of involvement would favor the high achiever. The involvement scoring categories were *need*, *affect*, *anticipation of success*, and *instrumental activity* relating to an achievement goal. *Anticipation of success* was judged to be a different sort of involvement category from the other three and was not used.

When all of the high-achieving boys (both grade levels) were compared with all the low-achieving boys on the involvement categories, the high achievers scored significantly more often in these categories (significance level 0.01).

This finding suggests that involvement, or the ability to become self-engaged in achievement tasks, is a characteristic of the high achieving boy. Researchers using this instrument may find it profitable to pay more attention to the involvement categories than they have in the past. It seems that these categories measure emotional reactions of the individual which are probably less influenced by social-acceptance types of responses than is true of the evaluation categories.

> 2. *There will be no difference between high- and low-achieving girls on need for achievement.*

A two-tailed significance test was necessary (on the McClelland test) to test hypothesis 2. The difference between the high and low tenth-grade girls is at the 0.64 significance level and for the twelfth-grade girls the significance level is 0.66.

This test represented one area where girls differed from boys. Girls who were not motivated to achieve academically may nontheless have been motivated to achieve via marriage. Since they were not planning to attend college, they may have been somewhat more inclined to attribute achievement to the male stimulus figures which appeared in the pictures. The high-achieving girl, on the other hand, was more likely to be planning to attend college. She was therefore still in academic competition with men and may have been less inclined to view achievement as strictly a man's role. For this reason she might have hesitated to tell achievement stories about the male stimulus figures, thus lowering her score. In any event, the test failed to differentiate significantly between high- and low-achieving girls.

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[17] Jackson, Philip W., and Shekelle, Richard B., "Need-Achievement Scoring Criteria." Unpublished manuscript, the University of Chicago.

> 3. *High-achieving students will value achievement more highly than low-achieving students as measured by the Strodtbeck and deCharms instruments.*

The prediction that high-achieving students would value achievement more highly than low-achieving students was tested by using an eight-item values scale developed by Strodtbeck, and a nine-item scale developed by deCharms.

Strodtbeck's scale was designed to measure three aspects of achievement values related to success on the American scene. The individual who plans for the future, who thinks he can manipulate the world to his advantage, and who desires individual credit for accomplishment, holds values related to success. The high-achieving tenth-grade boys held these values to a significantly ($P=0.01$) higher degree than did low-achieving boys. (See table 1.) In the case of the twelfth-grade boys, there was no significant difference, although the low-achieving twelfth-grade boys scored somewhat higher ($P=0.46$) than the high achievers.

On deCharms' instrument, which was designed to indicate the student's opinion regarding his achievement motivation, the tenth-grade high boys scored higher ($P=0.15$). The twelfth-grade boys were also consistent with their scores on Strodtbeck's instrument, the low twelfth-grade boys scoring higher ($P=0.32$) than the high boys; hence there was some support for hypothesis 3 in the case of tenth-grade boys, but none in the case of twelfth-grade boys.

The only explanation for the reversals between tenth- and twelfth-graders on these tests is speculative. The low-achieving twelfth-grade boys had failed to live up to the expectations held for them. They were aware of this and were also cognizant of the social values necessary for success. It may be that their high scores on these two instruments represented compensatory behavior, an attempt to say the "right" things.

The girls at both grade levels came out as predicted on both of these scales. This is in keeping with the statement of rationale for girls.

High girls at both grade levels were more consistent than boys in valuing achievement. (See table 1.) The high tenth-grade girls scored higher (P=0.13) on Strodtbeck's scale and higher also (P=0.02) on the deCharms scale. The twelfth-grade high girls were higher (P=0.11) on Strodtbeck's scale and significantly (P=0.05) higher on deCharms'.

4. *High-achieving girls will value individual credit more highly than low-achieving girls.*

This hypothesis is based on an item from Strodtbeck's V-scale which states that "The best kind of job to have is one where you are part of an organization all working together, even if you don't get individual credit." For this comparison the high girls at both grade levels were compared with the low girls at both grade levels. The high girls disagreed with the above item significantly (P=0.01) more often than the low-achieving girls. The high-achieving girls wanted individual credit for accomplishments.

5. *High-achieving students will score higher on the student interview measure of educational motivation factors than low-achieving students.*

This hypothesis was based on the student-interview data which were designed to assess motivational differences between high- and low-achieving groups, as these differences were revealed through important adult identifications, reading habits, educational goals, subjects liked, peer influences, etc. The interview was first scored on the subscales, and then the subscale scores were added for a total "strength of educational motivation score." Total score results are included in table 2.

The differences between high and low achievers on strength of educational motivation were significant in all cases. The differences

TABLE 2.—Educational motivation scores by sex, grade level, and achievement on a student interview

Grade and sex of student	Number in group	High achievers		Low achievers		P-value
		Mean	Standard deviation	Mean	Standard deviation	
1	2	3	4	5	6	7
10th grade:						
Boys	27	23. 37	4. 52	18. 63	3. 90	0. 001
Girls	33	22. 12	5. 75	18. 61	4. 31	0. 002
12th grade:						
Boys	24	22. 54	4. 93	18. 96	6. 27	0. 01
Girls	29	20. 69	5. 66	17. 41	6. 47	0. 02

between high and low boys were significant at the 0.01 level at each grade level and the differences between the girls were at the 0.02 level in both instances. Thus a personal interview report by the student reveals differences between high- and low-achieving boys and girls.

Adjustment

1. ***High-achieving boys and girls will score higher on adjustment as measured by the California Psychological Inventory than their low-achieving peers.***

High achievers were significantly better adjusted as measured by the California Psychological Inventory (CPI). This was strongly supported as indicated by the total score for tenth-grade boys (0.01 level), tenth-grade girls (0.001 level), twelfth-grade boys (0.001 level), and meagerly supported for twelfth-grade girls (0.18 level). (See table 3.)

The CPI measures the following eighteen facets of interpersonal psychology:

1. Dominance
2. Capacity for status
3. Sociability
4. Social presence
5. Self-acceptance
6. Sense of well-being
7. Responsibility
8. Socialization
9. Self-control
10. Tolerance
11. Good impression
12. Communality
13. Achievement via conformance
14. Achievement via independence
15. Intellectual efficiency
16. Psychological-mindedness
17. Flexibility
18. Femininity

TABLE 3.—Adjustment scores by sex, achievement, and grade level on the California Psychological Inventory [1]

Grade and sex of subject groups	High achievers		Low achievers		P-value
	Mean	Standard deviation	Mean	Standard deviation	
1	2	3	4	5	6
10th grade:					
Boys	56.16	5.24	52.49	5.63	0.01
Girls	54.95	4.16	50.27	7.37	0.001
12th grade:					
Boys	56.64	6.05	49.60	7.49	0.001
Girls	55.09	5.47	53.73	5.73	0.18

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[1] Gough, H. G. California Psychological Inventory, Consulting Psychologists Press, Inc.

The first six scales measure the areas of poise, ascendancy, and self-assurance. Scales 7 through 12 are measures of socialization, maturity, and responsibility. Scales 13, 14, and 15 measure achievement potential and intellectual efficiency. The last three scales (16–18) are measures of intellectual and interest modes. Means for the subscales are not presented in the table, but of 72 pairs of scores there were only three exceptions to the superiority of the high achievers. First, the low-achieving girls at both grade levels were somewhat more *flexible*. (Scale 17.) This is understandable if the high-achieving girls were achieving through conformance. This proved to be the case on scale 13, *conformance*. On this scale the high-achieving tenth-grade girls are higher (P=0.002) and the high-achieving twelfth-grade girls are higher (P=0.06). In the case of the twelfth-grade girls, scale 1, *dominance*, had an equally significant difference favoring the high achievers. Dominance, conformance, and rigidity undoubtedly have common elements.

There was one scale reversal for tenth-grade boys. On scale 4, *social presence*, the low-achieving boys were higher. To be significant on a two-tailed test the 0.04 would be 0.08 and short of the 0.05 significance level. The explanation for this phenomenon may lie with social status. The low-achieving tenth-grade boys were as high on social status (table 6) as their high-achieving peers. Social presence may be correlated with status. Since this scale was not included when the test was given to the twelfth-grade boys, no comparison can be made.

The low-achieving twelfth-grade girls scored higher on scale 6, *sense of well-being*. Again social status may be at work. The low-achieving twelfth-grade girls were actually higher (P=0.20 on a two-tailed test) on social status as shown in table 6. Of course, a difference of the magnitude reported could have come about as a result of chance.

> 2. *High-achieving boys and girls will have higher friendship and leadership scores and lower aggressive and withdrawn maladjustment scores than low-achieving boys and girls.*

This hypothesis with its two subhypotheses was tested by using the Who Are They (peer rating instrument) and the Behavior Description Chart (teacher rating instrument). Both instruments were developed by the Quincy Youth Development Commission staff. (See table 4.)

On the Who Are They (WAT) test, leadership (L.) differentiated between the high- and low-tenth-grade girls at the 0.01 level, but failed to differentiate between tenth-grade boys. At the twelfth-grade level it differentiated between high and low boys at the 0.01 level and girls at the 0.06 level. The hypothesis received some support.

TABLE 4.—Student ratings (WAT), teacher ratings (BDC), and activities ratings (JAI), by sex, achievement (high and low), and by grade level [1]

Ratings	Tenth Grade									
	Boys					Girls				
	Achievement				P-value	Achievement				P-value
	High (N=27)		Low (N=26)			High (N=32)		Low (N=32)		
	Mean	Standard deviation	Mean	Standard deviation		Mean	Standard deviation	Mean	Standard deviation	
1	2	3	4	5	6	7	8	9	10	11
Student, WAT:										
Aggression	50.1	8.2	56.0	9.9	0.01	48.5	8.2	51.8	8.4	0.05
Withdrawal	47.2	7.8	51.2	7.8	.03	48.2	9.2	52.7	7.5	.01
Leadership	56.0	9.6	54.3	10.9	--------	59.9	8.8	54.6	8.1	.01
Friendship	53.0	10.7	53.8	11.7	--------	58.4	11.0	55.4	9.4	--------
Teacher, BDC:										
Aggression	46.5	8.3	56.3	9.3	0.001	44.3	8.5	47.9	7.8	0.04
Withdrawal	45.8	9.3	45.9	11.2	--------	44.6	7.2	47.1	8.8	.11
Leadership	56.3	8.8	49.6	9.2	.004	60.4	7.3	55.0	8.6	.003
Activities, JAI	52.0	10.8	53.3	9.1	(2)	57.7	7.7	54.6	10.5	0.01
	Twelfth Grade									
	Boys					Girls				
	Achievement				P-value	Achievement				P-value
	High (N=24)		Low (N=24)			High (N=29)		Low (N=29)		
	Mean	Standard deviation	Mean	Standard deviation		Mean	Standard deviation	Mean	Standard deviation	
Student, WAT:										
Aggression	44.7	7.0	51.0	8.8	0.003	45.9	8.0	44.4	7.2	(2)
Withdrawal	46.4	9.5	45.8	7.6	--------	45.1	9.6	45.6	8.8	(2)
Leadership	58.9	8.2	52.8	10.7	.01	60.7	8.5	56.9	10.4	0.06
Friendship	56.2	10.2	52.8	7.9	.10	56.7	8.9	54.0	8.6	--------
Teacher, BDC:										
Aggression	47.3	7.6	49.9	8.3	0.13	45.1	7.4	47.5	8.4	--------
Withdrawal	45.1	10.8	43.2	8.8	--------	46.1	9.5	46.2	10.5	--------
Leadership	57.6	9.5	52.9	8.5	.04	60.1	8.6	55.8	7.5	0.02
Activities, JAI	55.8	8.7	51.4	11.0	0.07	54.4	8.5	50.9	7.7	0.05

[1] The analyses in the table were based on t-scores.

[2] The direction of the prediction was reversed.

On the teacher rating Behavior Description Chart (BDC) the teachers differentiated the high and low achievers on leadership at the 0.004 level for tenth-grade boys, the 0.003 level for tenth-grade girls, the 0.04 level for twelfth-grade boys, and the 0.02 level for twelfth-grade girls. When both the student and teacher measures of leadership are considered, the hypothesis that high achievers possess more leadership ability was strongly supported.

Friendship was measured only by the WAT. The only group which approached significance was that of the twelfth-grade boys, and the level was only 0.10; therefore friendship scores do not differentiate between high and low achievers in this study.

The aggression dimension (Agg.) of the WAT revealed a significant difference between high and low achievers in the case of tenth-grade boys (0.01 level) and tenth-grade girls (0.05). At the twelfth-grade level it differentiated only for boys (0.003 level). The aggression dimension on the BDC (teacher rating instrument) differentiated for the same groups. The hypothesis that high achievers would be less aggressive is supported by both measures except in the case of the twelfth-grade girls.

The withdrawn dimension (Wd) of the WAT differentiated only for the tenth-grade students. Here the students themselves differentiated between high and low achievers at the 0.03 level for tenth-grade boys and at the 0.01 level for tenth-grade girls. Teachers (BDC) differentiated between high and low achievers on the withdrawn dimension only in the instance of the tenth-grade girls and here the significance was at the 0.11 level. Withdrawn maladjustment as measured by the WAT was revealed somewhat more clearly by the students than by teachers, but failed to differentiate significantly between high and low achievers as well as did aggressive maladjustment.

3. *The low-achieving boys will evidence more aggressive maladjustment and the low-achieving girls more withdrawn maladjustment.*

The assumption that aggression is more acceptable from boys is the basis for this hypothesis. Evidence supporting this hypothesis is contained in table 4. The mean scores combined for the low boys and low girls are presented in table 5 for both measures. As can be observed from these figures, low boys were seen to be more aggressive than low girls by both peers and teachers.

The mean scores (see table 5) for withdrawn maladjustment indicated that the students, as revealed by WAT, considered girls to be more withdrawn. This was consistent with teachers' (BDC) ratings,

TABLE 5.—Mean score on tests for maladjustment of low-achieving boys and girls

Test and maladjustment behavior	Mean score of low-achieving students	
	Boys	Girls
Who Are They:		
Aggression	53.5	48.1
Withdrawal	45.9	49.6
Behavior Description Chart:		
Aggression	53.1	47.7
Withdrawal	45.5	46.3

although the ratings of the latter did not differentiate as sharply as the students'.

4. *High social-status, low-achieving boys will be more seriously maladjusted as measured by the WAT and BDC than high-status low-achieving girls.*

This hypothesis is based on the assumption that achievement expectations impinge more acutely on the high-status boy than on the high-status girl. The boy must achieve in the world to retain his status, while the girl needs only to marry within her status. An Index of Status Characteristics (ISC) score was available on every student in the tenth and twelfth grades. The students at each grade level were divided into four status groups, as follows: A (upper and upper-middle); B (lower-middle); C (upper-lower); and D (lower-lower).

The tenth- and twelfth-grade boys (combined) who were in the lowest third of their respective groups in achievement and whose ISC scores placed them in status groups A or B were compared with tenth- and twelfth-grade girls selected on the same basis. The data appear in table 6 below.

The boys were significantly (0.001 level) more aggressive as measured by each of the instruments. Thus the low-achieving, high-ISC boy was well above the mean on aggressive maladjustment, whereas the low-achieving, high-ISC girl scored below the class mean.

These findings are in line with the data in table 4 for low-achieving students. A comparison of the WAT scores of these 14 high-status low-achieving boys (57.2 in table 6) with the low-achieving boys (56.0 and 51.0) in table 4, indicated the high-status boys were seen by their peers to be more aggressive than low achievers. The teachers (BDC) also saw these boys as somewhat more aggressive than the average low achiever.

TABLE 6.—Aggressive maladjustment (t-scores) of boys and girls, with achievement and status constant

Test	10th and 12th-grade low-achieving students with high scores on Index of Status Characteristics				P-value
	Boys		Girls		
	Mean	Standard deviation	Mean	Standard deviation	
1	2	3	4	5	6
Behavior Description Chart (N=13 boys, 20 girls)	54. 69	3. 65	46. 85	2. 61	0. 001
Who Are They (N=14 boys, 20 girls)	57. 21	2. 75	49. 40	9. 03	. 001

5. *High-achieving students will have been more active than low-achieving students in school-related activities during junior high school.*

This prediction was supported at the 0.01 level for tenth-grade girls, the 0.07 level for twelfth-grade boys, and the 0.05 level for twelfth-grade girls. (See the P-values for the JAI scores in table 4.) The difference was not significant in the case of tenth-grade boys. The high achiever was generally more active in school-related activities before he entered high school.

Student Data

1. *Where significant differences are found on the values test the high-achievers will describe the test concepts more positively than the low-achieving students.*

A brief description of the test may clarify the following report. The Sematic-Differential test was adapted from Osgood[18] for the purpose of measuring meanings or students' attitudes toward selected concepts.

In adapting the test for this study, an attempt was made to select concepts and adjective pairs which would allow the student to describe the extent to which he valued the various concepts. Concepts were chosen which were believed to be related to achievement behavior. They were *yourself*, *mother*, *father*, *student*, *work*, *competition*, *success*, *love*, *faith*, *imagination*, and *school*. The 14 adjective pairs

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[18] Osgood, Charles E., Suci, George J., and Tannenbaum, Percy H., *The Measurement of Meaning*. Urbana, Ill., University of Illinois Press, 1957.

(used for describing the concepts) were factored and 2 distinct factors emerged which are referred to as the *evaluative* and *industry* factors. The adjective pairs which contributed to the *evaluative* factor were ugly-beautiful, sad-happy, worthless-valuable, and good-bad. For the *industry* factor the adjective pairs hardworking-lazy and hazy-clear were the ones with high loadings.

A three-way analysis of variance design was used for testing the difference between (1) all high vs. all low achievers, (2) all boys vs. all girls, and (3) tenth- vs. twelfth-graders.

Data presented in table 7 show the differences on each concept (where significant) first on the *evaluative* factor and then on the *industry* factor.

TABLE 7.—Analysis of variance—High vs. low achievers, boys vs. girls, and 10th vs. 12th grades on semantic differential concepts

Concepts	EVALUATIVE FACTOR					
	Achievement High achievers vs. low achievers		Sex Girls vs. boys		Grade 10th vs. 12th	
	(N=113)	(N=113)	(N=124)	(N=102)	(N=120)	(N=106)
	F-test score	P-value	F-test score	P-value	F-test score	P-value
1	2	3	4	5	6	7
School	18. 55	0. 001	6. 10	0. 05	--------	[1] N.S.
Student	--------	N.S.	3. 25	. 10	5. 99	0. 05
Work	3. 10	. 10	--------	N.S.	--------	N.S.
Competition	3. 30	. 10	5. 10	[2]. 05	--------	N.S.
Love	--------	N.S.	9. 70	. 01	--------	N.S.
Faith	--------	N.S.	3. 78	. 10	--------	N.S.
Imagination	3. 78	[2]. 10	--------	N.S.	6. 54	. 05
	INDUSTRY FACTOR					
School	29. 17	0. 001	9. 99	0. 01	9. 68	0. 01
Self	5. 02	. 05	--------	N.S.	--------	N.S.
Student	4. 24	. 05	--------	N.S.	--------	N.S.
Work	--------	N.S.	3. 35	. 10	--------	N.S.
Competition	3. 9	. 05	--------	N.S.	--------	N.S.
Love	--------	N.S.	5. 85	. 05	--------	N.S.
Faith	--------	N.S.	3. 5	. 10	--------	N.S.

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[1] Means "not significant."

[2] Boys valued competition more positively than girls. This was the only exception to the girls' more positive evaluating of the concepts.

THE EVALUATIVE FACTOR:

1. *High vs. low achievers.*—The high-achieving students valued *school* more highly at the 0.001 significance level. *Work* and *imagination* approached the 0.05 level, but failed to reach it. When the three concepts were combined, the difference in favor of the high achievers was at the 0.001 level. These findings were predicted.

2. *Girls vs. boys.*—Girls evaluated more highly *school* (0.05 level) and *love* (0.01 level). They valued *faith* and *imagination* more highly, but these ratings failed to reach the 0.05 significance level. Boys evaluated *competition* more highly than girls at the 0.05 level.

3. *Tenth vs. twelfth grades.*—The tenth graders valued *student* and *imagination* more highly than the twelfth graders at better than the 0.05 level. This significance held when work was included.

THE INDUSTRY FACTOR:

1. *High vs. low achievers.*—High achievers described the concepts *school* (0.001 level) and *self* (0.05 level) as significantly more positive (hardworking and clear) than did low achievers. Also, *student* and *competition* were described more positively by the high-achievers (0.05 significance level).

2. *Girls vs. boys.*—Girls described the concepts *school* (0.01 level) and *love* (0.05 level) as significantly more positive (hardworking and clear) than did boys. They were more positive on *work* and *faith* but failed to reach the 0.05 level of confidence.

3. *Tenth vs. twelfth grades.*—The tenth-grade students described *school* more positively in terms of the industry factor (hardworking and clear) than did twelfth-graders.

In summary, this instrument revealed that high achievers evaluated more positively the concepts *school*, *work*, and *imagination*, which are necessary to academic success. They described as more industrious (hardworking and clear) the concepts *school*, *self*, *student*, and *competition*. In relation to these values they saw themselves as persons and students more actively engaged in the competitive school situation. Girls also, except for competition, viewed the concepts more positively and as being more industrious than did the boys.

Although no hypothesis was formulated as to the girls' more positive expressions on the Semantic-Differential, the finding was consistent with the rationale which views the school as a particularly favorable place for girls to meet their needs and receive rewards.

2. *High achievers will name fathers as having been important influences in their lives significantly more often than will low achievers.*

This hypothesis is based on the belief that the role of a mother is similar in importance to both high- and low-achieving students, but that fathers are more important as positive influences in the life of the high achiever.

The high-achieving groups in all instances named fathers more often than did the low achievers as important influences in their lives. When all highs were compared with all lows, the difference was significant at the 0.002 level. The low achievers mentioned important adults in their lives about as often as the high achievers; the difference was that the low achiever tended much more often to bypass the father and mention a minister, teacher, or some other adult as having been important to him.

3. *High-achieving students will be more active in religious activities than low-achieving students.*

The theory behind this hypothesis was that the high achiever would be functioning more adequately than the low achiever and that religious activity would be one more area in which he would find an outlet for his energies. For this comparison all high achievers were compared with all low achievers (high and low number=113 each). The percent in each religious-activity category was:

	High achievers	*Low achievers*
Very active	50.44	31.86
Somewhat active	24.78	32.74
Not very active	10.62	23.01

No significance test was made, but the picture presented is consistent with the prediction. A few students who failed to answer the question and some who had no church affiliation were not included in the above categories.

4. *High-achieving students will come from homes with higher socioeconomic status than low-achieving students.*

This hypothesis is based on the assumption that high-status families have higher expectations and more resources for helping their children live up to their expectations than is true for lower-class families. Thus the hypothesis is that high achievers will have higher ISC scores than low achievers. (See table 8.)

The hypothesis was supported at the 0.04 level for tenth-grade girls and at the 0.02 level for twelfth-grade boys. There was no difference in the case of tenth-grade boys and a rather substantial reversal in the case of the twelfth-grade girls. This finding on twelfth-grade

TABLE 8.—Index of Status Characteristics (ISC), by grade, sex, and achievement[1]

Grade and sex	Number of students	Achievement				P-value
		High		Low		
		Mean	Standard deviation	Mean	Standard deviation	
1	2	3	4	5	6	7
10 grade:						
Boys	27	57. 19	--------	57. 41	--------	N.S.
Girls	33	58. 0	9. 78	53. 85	9. 52	0. 04
12th grade:						
Boys	24	55. 52	4. 63	49. 76	2. 10	0. 02
Girls	29	52. 97	6. 7	55. 28	6. 84	[2] 0. 10

[1] The analyses in the table are based on t-scores.
[2] Indicates the reverse of the prediction.

girls was discussed in connection with the California Psychological Inventory. The support for this hypothesis was meager so far as this study is concerned. However, the subjects in this study, both high and low achievers, were already a select group who were above the mean ISC for their grade level.

Parent Data

Data on parents were gathered through personal interviews with mothers, the administration of the Parental Attitudes Research Instrument (PARI), and the Semantic-Differential test of values. A comparison was made among mothers of all high achievers and low achievers on the interview data. Only 2 of the 120 tenth-grade mothers and 10 of the 109 twelfth-grade mothers were missed by the interviewers. Tests of proportions were used in analyzing the parent data.[19]

1. *High achievers will have better-educated parents than low achievers.*

The dividing line was arbitrarily set at the high school level. For the analysis, parents with high school or less were given a *zero* score and those with high school and some college a *plus* score. More of the high achievers' parents attended college, as predicted; the significance level was 0.01.

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[19] Wallis and Roberts, op. cit.

TABLE 9.—Education of parents of high and low achievers

Parents	Education		All parents interviewed
	Some college +	High school or less 0	
1	2	3	4
Low achievers	48	163	211
High achievers	67	135	202
Total	**115**	**298**	**413**

2. *High-achieving students will have mothers who report them to be more responsible and independent than will be true for low-achieving students.*

Separate tests were given for independence and responsibility. The answers mothers gave to the questions on responsibility were written down and then the interviewer rated the degree of responsibility. A plus score was recorded for each answer in which the mother rated the student as being unequivocally responsible. A zero score was recorded if her answer indicated any degree of lack of responsibility on the part of the student.

The proportion of high achievers' mothers when compared with low achievers' mothers who rated their children as very responsible was high, with a difference in favor of the high achiever at beyond the 0.001 level ($K=5.46$). This finding was consistent also with the *responsibility* subscore of the CPI.

The concept of independence was handled in the same manner as "responsibility," but the difference on this measure was not as great. The difference in favor of the high achievers was significant at the 0.03 level. This smaller difference may or may not have been the result of the scores for boys and girls. Evidence to be reported in connection with the PARI instrument that mothers of high achieving girls are more authoritarian, strict, and controlling may have been a factor in depressing the significance level on the independence test.

3. *High-achieving students will have mothers who have higher educational aspirations for their children than low-achieving students.*

The mothers included for the comparison on educational aspirations were only those who wanted their children to attend college vs. those who did not have college aspirations for their children. Trade school, business training, etc., were not included. The proportions in table 10 indicate the numbers involved. The difference was significant at the 0.004 level supporting the hypothesis.

The occupational aspect was tested by dividing the reports on mothers into those who wished their child to enter a profession vs. those who did not. The mothers of low achievers differ less on the latter measure than on the college aspiration measure. The significance in favor of the high achievers' mothers was just below the 0.05 level (K=1.60).

TABLE 10.—Number of mothers with college aspirations for their children

Mothers of—	College aspirations		All mothers interviewed
	Yes	No	
1	2	3	4
Low achievers	53	20	73
High achievers	81	9	90
Total	**134**	**29**	**163**

This may have indicated that the mothers of low achievers were more likely to hold unreasonable goal expectations for their children than mothers of high achievers.

> 4. *Mothers of high achievers will report their children engaged in more educationally related hobbies than mothers of low achievers.*

The mothers of the students were asked about the hobbies and special interest areas of their children. The different hobbies were listed and then divided into academically related and nonacademically related. Those which were agreed to be academically related were *reading*, *electronics*, *collections*, *chess*, *science*, *maps*, *writing*, *dramatics*, and *poetry*. The number of mothers of high achievers was compared with the number of mothers of low achievers reporting on the academically related hobbies of their children. (See table 11.)

The differences were in favor of the high achievers; the significance level was better than the 0.001 level. The high achiever was either encouraged, or allowed to engage in, more hobbies related to academic achievement.

> 5. *High-achieving students will more often be first-born or only children and will come from families of three or fewer children more often than low-achieving students.*

The reason for this prediction was that there would be more parent time, attention, and resources available to children from small fami-

TABLE 11.—Number of mothers reporting on hobbies of high- and low-achieving students

Mothers of—	Hobbies		All mothers reporting
	Academically related	Not academically related	
1	2	3	4
Low achievers	46	61	107
High achievers	70	35	105
Total	**116**	**96**	**212**

lies than in larger families, and that such adult attention is an additional factor favoring high achievement.

Families were divided on the basis of three or fewer children and four or more, and then the family size for high- and low-achieving students compared. The figures are presented in table 12.

The difference favoring a high achiever coming from a small family is significant at the 0.02 level. The significance is even higher for the second part of the hypothesis; that is, the high achiever is either the first-born or an only child (P=0.005). It may be that the importance of adult stimulation, interest, and expectations related to the child tend to be overlooked.

6. *Mothers of high-achieving boys will receive lower scores on the authoritarian-control factor of the PARI than mothers of low-achieving boys.*

The Parental Attitudes Research Instrument (PARI) was used for making the comparisons. This instrument consisted of twenty-three 5-item scales (see table 14), and was factored by Marvin Zuker-

TABLE 12.—Size of families of high- and low-achieving students

Families of—	Siblings		All families represented
	3 or fewer	4 or more	
1	2	3	4
Low achievers	76	34	110
High achievers	86	19	105
Total	**162**	**53**	**215**

man.[20] They found three factors which they called *authoritarian-control* (which included 16 scales), *democratic attitudes* (3 scales), and *hostility-rejection factor* (3 scales).

The mothers of the 20 (10 from each grade level) highest-achieving girls were compared with the mothers of the 20 lowest-achieving girls (both grade levels). The same comparison was made for the mothers of boys. The findings on the authoritarian control factors are reported in table 13.

TABLE 13.—Mean, standard deviation, and probability level of mothers' scores on authoritarian-control factor of the Parental Attitudes Research Instrument (PARI)

[N=20 in each group]

Mothers of—	Mean	Standard deviation	P-value
1	2	3	4
Girls:			
High-achieving	189.4	37.0	
Low-achieving	172.20	30.6	0.02
Boys:			
High-achieving	171.2	34.8	
Low-achieving	199.85	28.6	.002

As predicted, the mothers of the high-achieving boys were significantly lower on the authoritarian-control factor. Although not shown in table 13, the mothers of the highest 20 boys were significantly higher (0.04 level) on the democratic attitudes factor than the mothers of the lowest 20 boys. This is precisely what was expected.

The scale-by-scale comparisons on mothers of high-achieving twelfth-grade boys vs. mothers of low-achieving twelfth-grade boys is revealing and appears in table 14.

The scores of mothers of the low-achieving boys were higher in fostering dependency, breaking the will, strictness, excluding outside influence, deification, approval of activity, avoidance of communication, suppression of sex, ascendance of mother, intrusiveness, and acceleration of development. The significance levels range from 0.004 on deification to 0.12 on breaking the will. This array of higher scores on these particular scales by mothers of low achievers is quite impressive. When the scores of mothers of the high and low tenth-grade boys were combined with the score of the twelfth-grade mothers and a comparison made between the scores of the mothers of both high- and low-achieving boys, the differences were even greater.

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[20] Zukerman, Marvin, et al. "Normative Data and Factor Analysis." *Journal of Consulting Psychology,* Vol. 22, No. 3, 1958.

TABLE 14.—Scores on Parental Attitudes Research Instrument (PARI) of mothers of high- and low-achieving 12th-grade boys[1]

Attitudes	Mothers of 12th-grade boys (N=22)				P-value
	High achievers		Low achievers		
	Mean	Standard deviation	Mean	Standard deviation	
1	2	3	4	5	6
1. Encouraging verbalization	18. 23	2. 02	17. 84	2. 10	------
2. Fostering dependency	11. 77	2. 81	13. 50	3. 44	0. 07
3. Seclusion of mother	12. 23	3. 69	11. 59	3. 55	------
4. Breaking the will	9. 73	2. 14	11. 09	3. 44	. 12
5. Martyrdom	9. 50	3. 87	10. 36	3. 39	------
6. Fear of harming the baby	12. 68	3. 96	12. 73	2. 96	------
7. Marital conflict	14. 64	3. 51	14. 82	3. 14	------
8. Strictness	13. 77	3. 90	15. 77	2. 74	. 05
9. Irritability	13. 00	3. 59	12. 64	3. 82	------
10. Excluding outside influence	10. 41	3. 20	12. 36	3. 85	. 11
11. Deification	11. 50	3. 20	14. 36	3. 30	. 004
12. Suppression of aggression	10. 41	3. 26	11. 32	3. 18	------
13. Rejection of homemaking	10. 09	3. 31	10. 00	3. 32	------
14. Equalitarianism	16. 95	2. 38	17. 14	2. 17	------
15. Approval of activity	13. 36	3. 12	15. 14	2. 10	. 03
16. Avoidance of communication	9. 73	2. 99	11. 95	3. 30	. 02
17. Inconsiderateness of husband	11. 00	3. 81	11. 95	3. 75	------
18. Suppression of sex	8. 95	2. 75	10. 95	2. 92	. 02
19. Ascendancy of mother	11. 14	3. 64	12. 09	3. 93	. 05
20. Intrusiveness	9. 27	3. 56	11. 68	4. 38	. 05
21. Comradeship and sharing	18. 55	1. 59	18. 87	1. 82	------
22. Acceleration of development	13. 32	3. 78	15. 00	2. 43	. 08
23. Dependency of mother	12. 75	3. 72	12. 05	3. 47	------

[1] Probability levels are based on a 2-tailed test.

7. *Mothers of high-achieving girls will score higher than mothers of low-achieving girls on the PARI authoritarian-control factor.*

As predicted, the high-achieving girls' mothers scored higher on the authoritarian-control factor. The significance was at the 0.02 level. In line with this finding was the finding on the *strictness* scale. All mothers of high-achieving girls (N=57) and of low-achieving girls (N=53) were compared on this scale. The mothers of high-achieving girls were significantly more strict (0.05 level). One other scale which differentiated between the tenth-grade mothers only was the equalitarian scale. The mothers of the high achievers were higher (more equalitarian) on this scale (0.02 level); so while the mothers of the high-achieving girls are more authoritarian, controlling, and strict, they also provide evidence of holding higher attitudes regarding equality. This may be very important to the high-achieving girl who is being pushed to achieve in a "man's world." Neither the irritability nor the *democratic attitude* factors revealed significant differences between the mothers of girls, nor did other scale-by-scale comparisons.

8. *The concepts measured by the Semantic Differential will be valued more highly by the mothers of the high achievers in those instances where the differences are significant.*

For this comparison only 20 mothers and 4 concepts were used. Mothers of the 10 highest achieving students (2 each from the twelfth-grade high-achieving boys and girls groups and 3 each from the tenth-grade high-achieving boys and girls groups) were compared with mothers of the 10 lowest achieving students selected in the same manner. These mothers were compared on the concepts *your child*, *student*, *success*, and *imagination* across all 14 adjective pairs. A 3-way analysis of variance—adjective pairs vs. concepts vs. mothers of 10 high- and 10 low-achievers—was used for making the comparisons. The difference in the way the mothers described the four concepts on the adjective pairs was significant at the 0.05 level. The mothers of the high achievers viewed the concepts more favorably, as predicted. Among the four concepts compared, *imagination* was the only one taken singly which differentiated significantly. Mothers of high achievers described this concept more favorably than the mothers of low achievers at beyond the 0.001 significance level.

Interesting differences on concepts by adjective pairs are given as follows: on the *fast-slow* adjective pair, mothers of low achievers described their children as fast. On *calm-disturbed*, the mothers of the highs saw their children as calmer. On the concept *success* the mothers of highs saw their children as faster than did the lows, and as clearer on the concept *imagination*.

Related Findings

As a part of the student interview the students were asked to name the teachers who had been most encouraging and the ones who had been most discouraging. The 10 teachers who had the most positive mentions were compared with the 10 with the most negative mentions on the Semantic Differential. These groups were compared on the concepts *fathers* (of students), *students*, *success*, and *imagination*, using all 14 of the adjective pairs as in the above study of mothers. These findings are presented in table 15.

TABLE 15.—3-way analysis of variance (adjective pairs vs. concepts vs. liked and disliked teachers)

Source	X^2	Degree of freedom	Variance Est.	F-test score	P-value
1	2	3	4	5	6
Rows (adjective pairs)	277. 50	13	21. 346	15. 742	0. 0001
Columns (concepts)	107. 31	3	35. 770	26. 379	. 0001
Blocks (teachers)	39. 00	1	39. 000	28. 761	. 0001
Rxc	130. 33	39	3. 342	2. 465	. 001
Rxb	11. 61	13	. 893	--------	N.S.
Bxc	21. 63	3	7. 210	5. 317	. 01
RxBxc	42. 11	39	1. 080	--------	N.S.
Within	1, 366. 50	1, 008	1. 356	--------	--------
Total	1, 995. 99	1, 119	--------	--------	--------

As can be observed in the Bxc row the encouraging (well-liked) teachers described the concepts more favorably at better than the 0.01 significance level. In other words, they valued *fathers* (of students), *students*, *success*, and *imagination* more highly than did the discouraging (disliked) teachers.

The results of comparing the concepts were as follows:

1. The well-liked teachers described *students* (total adjective pair scores) more positively at the 0.001 significance level.
2. The well-liked teachers described *fathers* (of students) more positively at the 0.001 significance level.
3. They valued *success* more highly at the 0.04 significance level.
4. There was no significant difference between the two groups on the concept *imagination* on the total 14 adjective pair scores. Taken individually two adjective pairs showed significant differences:
    a. *Hardworking-lazy.* The well-liked teachers saw *imagination* as more hardworking (F=4.05; P=.05).
    b. *Happy-sad.* The least-liked teachers saw *imagination* as happier (P=0.05).

PARENT-CHILD AGREEMENT ON GOALS: A question on the parent interview pertained to the degree of agreement between parents and child on future plans. (See table 16 for portion of parents of the high- and low-achieving groups who agreed with the child and those who did not.)

Although the cell with the two in it looks suspiciously low, the expected frequency for that cell is six. Both the chi-square and proportions tests revealed differences between the two groups at the 0.05 significance level. This finding was interpreted as evidence that high

TABLE 16.—Parent-child agreement on future plans

Parents of—	Agree	Disagree	Number of parents reporting
1	2	3	4
Low achievers	73	9	82
High achievers	85	2	87
Total	**158**	**11**	**169**

achievers and their parents were working together toward meaningful goals to a greater degree than were low achievers and their parents.

A followup of the twelfth grades was made to determine the percent of high and low achievers who attended college the first year after graduation. The percentages of high- and low-achieving boys and girls who were attending college were 66.0 and 39.6, respectively. There was an approximately equal number of boys and girls in these groups.

Mean scores of high- and low-achieving twelfth-grade students on four developmental tasks are presented in table 17. Gordon Liddle[21] analyzed sentence-completion tests on the twelfth-grade students to get a measure of developmental task accomplishment in the areas of self-acceptance, acceptance of others, sex-role adjustment, and autonomy. The scores of high-achieving twelfth-grade boys and girls were combined and compared with the scores of twelfth-grade low achievers to see if there was a difference between them on this measure. The four task scores were added, to yield a total score on each student; a low score indicates relatively better success on the tasks.

TABLE 17.—Score on four development tasks

Students, boys and girls (N=52)	Mean	Standard deviation	F-value
1	2	3	4
High achievers	8.96	3.43	0.004
Low achievers	10.71	3.29	

High-achieving students made better scores on the developmental tasks than the low achievers.

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[21] Liddle, Gordon L., "A Study of the Relationships of Talent, Maladjustment, Sex, and Social Status to Maturity in Adolescents." Unpublished Ph. D. dissertation, the University of Chicago, 1959.

The high-achieving boys (N=24) were more successful on sex-role development (P=0.004), and acceptance of self (P=0.02) than low-achieving boys (N=24). The high-achieving girls (N=28) evidenced consistent superiority over low-achieving girls (N=28) on each developmental task, but none of the differences was significant. This finding is in line with the finding for the hypothesis stating that low achievement for a girl is less serious to her adjustment than it is for a boy.

The 24 low-achieving boys were compared with the 28 low-achieving girls. The girls demonstrated superior handling of the developmental tasks in three instances, namely, sex-role adjustment, autonomy, and self-acceptance. The difference in sex-role adjustment was the only one which was significant. The difference in favor of the low-achieving girl was significant at the 0.005 level. A conclusion can be drawn from this evidence: a girl can make a satisfactory sex-role adjustment without high achievement. For the able boy who is underachieving, satisfactory adjustment is much more difficult.

Summary and Findings

The top 30 percent in intellectual ability of the tenth- and twelfth-grade students in the Quincy Public Schools were divided into high and low achievers on the basis of ability in relation to performance (grades). The students were further divided by sex and grade level, which resulted in four major groups, as follows: (1) High- and low-achieving twelfth-grade boys; (2) high- and low-achieving twelfth-grade girls; (3) high- and low-achieving tenth-grade boys; and (4) high- and low-achieving tenth-grade girls.

These students were compared on motivation, adjustment, and family factors in order to ascertain (1) differences between high and low achievers and (2) differences between boys and girls.

1. *Motivation.*—On the unconscious need for achievement as measured by McClelland's (TAT) projective instrument the high-achieving boys scored higher than low-achieving boys at both grade levels. There were no differences between high and low girls on this test.

2. *Values.*—The high-achieving girls at both grade levels scored higher on Strodtbeck's and deCharms' achievement values instruments, and also on the single item, "need for individual credit," in Strodtbeck's test. Tenth-grade high-achieving boys scored higher (P=0.01) than the tenth-grade low-achieving boys on Strodtbeck's instrument, but failed to reach the 0.05 level on deCharms' instrument. There were no significant differences between high- and low-achieving twelfth-grade boys on these two tests.

3. *Strength of educational motivation.*—The student interview measure differentiated at better than the 0.02 significance level in all cases, with the high-achieving students scoring higher on this measure. Involved in this interview measure were the following: (1) Peer identification; (2) reading index; (3) educational goals; (4) grades desired; (5) monetary goals; (6) subjects liked; and (7) identification with adults important to the subject.

4. *Adjustment measures.*—The high-achieving students were better adjusted (0.01 level or better) as measured by the California Psychological Inventory in all instances except the twelfth-grade girls (P=0.18).

The high-achieving students scored higher on leadership skills, as measured by teachers and peers, but not on friendship as measured by peers.

On aggressive and withdrawn maladjustment, the low-achieving tenth-grade students scored higher, as predicted. The differences between the high- and low-achieving twelfth-grade students were not significant except that the twelfth grade low-achieving boys were seen by their peers to be more aggressive.

The high-achieving students reported that they had been more active in school-related activities at the junior high level.

5. *Semantic-Differential test of values.*—The high-achieving boys and girls valued the concepts *school*, *work*, and *imagination* more highly than did their low-achieving peers. In line with higher valuing of the above concepts, the high achievers rated as more active (industrious) *school*, *self*, *student*, and *competition*. Girls tended to score higher than boys and tenth graders higher than twelfth graders on this test.

6. *Important adults.*—High-achieving boys and girls named fathers as having been important influences in their lives significantly more often than did their low-achieving peers.

7. *Religious activity.*—High-achieving students reported that they were more active in religious groups than their low-achieving peers.

8. *Family factors.*—Parents of high achievers were better educated (based on highest grade completed) than parents of low achievers. The high achievers had mothers who reported them to be more responsible and independent. High achievers' mothers held higher educational aspirations for their children. Mothers of high achievers reported them to be engaged in more educationally related activities (music, science, etc.). High-achieving students came from families where they were the first-born or the only child more often than did low achievers. Small families produced proportionately more high achievers than did large families.

Mothers of high-achieving boys scored lower than mothers of low-achieving boys on the authoritarian-control factor of the parental attitudes (PARI) instrument. The reverse was true for mothers of girls. Here it appears that boys performed better under democratic attitudes, and girls performed better academically under authoritarian attitudes. This measure was obtained only from others. Mothers of high-achieving students valued *imagination* (Semantic-differential) significantly higher than did mothers of low-achieving students. On the basis of this study, McClelland's measure of unconscious need for achievement differentiates between high- and low-achieving boys but not girls. Girls appeared to place higher conscious value on achievement than boys. These findings were interpreted as adaptive responses to differing cultural expectations for boys and girls. A boy is evaluated for his personal achievement, hence his greater need for achievement; a girl is evaluated more for her personal relationships and marriage, hence girls were more conforming in their behavior and had a greater conscious concern for achievement values. Low-achieving boys in this study were more aggressively maladjusted than low-achieving girls. High-achieving boys had mothers who were democratic in attitudes toward them, whereas high-achieving girls had mothers who were authoritarian and controlling in attitudes.

Opportunities for Research on the Education of Gifted Students

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THE STUDY of the gifted has drawn the attention and interest of educators and psychologists for many years. Although progress has been made in the identification and understanding of gifted persons, most of the studies to date have been carried out on a limited basis due to restrictions in time, money, availability of subjects, and technical resources; the conclusions and generalizations arising from such studies have been correspondingly limited.

In the spring of 1960 a new study, Project Talent, tested almost half a million high school students, a 5 percent, nationally representative sample of the Nation's high school youth. A vast amount of data was gathered about these students and their schools and will continue to be gathered in the future. Although the project is not specifically a study of gifted children, its scope should make possible some of the most significant and unrestricted studies of gifted youth yet designed. For the first time many of the qualifications and limitations which have hampered earlier studies will have been eliminated.

This paper first discusses the special implications of Project Talent for the study of the gifted, then summarizes the background of the project, briefly describes the kinds of data it will soon make available, and suggests some of the research opportunities for studying gifted youth created by the availability of such data.

SIGNIFICANCE OF THE PROJECT

The data being collected through Project Talent go beyond "narrow" identification (prediction versus several cognitive tests) and make possible what might be called "broad-band" identification of the gifted; that is, the identification of a child as gifted in several areas of scholastic aptitude and in areas other than scholastic aptitude. While Project Talent has not attempted to measure certain performance capacities and special aptitudes such as athletic or musical ability, the data being collected do cover many aspects of human talents. Thus it will be possible to identify a child as being gifted (of superior capacity) with respect to any one or combination of a large number of human abilities. The "broad-band" identification of gifted children should lead to more intensive study and greater understanding of gifted children in several aspects of scholastic aptitude such as creativity, foreign language abilities, etc., as well as the more conventional single criterion of overall school achievement. Most research on gifted children to date has been focused on the latter area, and, important as it is, such research needs broadening to include other talent areas.

With increasing identification and recognition of the broader aspects of giftedness, it may be expected that educational institutions of various types will recognize and encourage increasingly the development of talents too often passed by in emphasizing the single "IQ."

The idea of "broad-base" cognitive functioning and "across-the-board" identification of giftedness is not new. However, such concepts are difficult to implement without a wide range of integrated, comparable measurements. In Project Talent there exists a unique opportunity to define giftedness in terms of measures covering much of the range of human talents, standardized on a sample of almost 500,000 students and 1,000 schools, representative of the high school youth of the Nation.

Additional opportunities for studying gifted children arise in connection with the planned and proposed followups of the entire national sample. At intervals of 1, 5, 10, and 20 years after graduation from high school, each student in the original sample will be questioned about his educational, vocational, and life plans and experiences. Such information will offer the opportunity to hypothesize about students identified currently as gifted on the criteria desired and then to follow up and validate such hypotheses. Of course, many new relationships may emerge when followup information for gifted children is related to the original data and to followup information for other students.

These data offer special advantages in that equating studies will be possible. Such studies can establish firm relationships between the Talent test battery and other test batteries. It will become possible to equate data from previous studies and studies employing other aptitude tests and batteries. Thus the results of previous research on gifted youth may be integrated with the vast pool of data from the nationally representative sample.

Finally, it should be pointed out that procedures will be set up whereby all of the data collected through the project may be utilized by qualified researchers for the furtherance of significant research projects. This data will be stored on magnetic tapes in a "data bank" for use by high-speed electronic computers. Precautions will be taken to preserve the anonymity of the respondents.

BACKGROUND AND OBJECTIVES OF PROJECT

In order to understand more fully the significance of Project Talent to the study of gifted children (and high school youth in general), it is helpful to look briefly at the background, direction, and objectives of this undertaking.

For more than 25 years, there has been serious discussion of the need for a program of research which would, on a nationwide basis, yield factual information about the nature and distribution of human talents, and how best to assist individuals to identify, develop, and use them. For example, an early proposal in this area suggested the selection of a "standard million"[1] to provide the basis for precise standards and norms representative of the total population of this country. In 1940, a proposal was presented by John C. Flanagan, director of Project Talent, to the Committee on Measurement and Guidance of the American Council on Education to draw a national sample for standardizing aptitude and achievement tests. After World War II a national census of aptitudes was proposed and received some encouragement; however, the groups involved eventually decided they could not support the study at that time, and these large-scale studies were not carried out.

There have been a number of smaller studies over the years that reveal some of the general pictures of available talent and its utilization. Recently the Educational Testing Service reported the results of a national survey of high school seniors sponsored by the National Science Foundation.[2] The survey included a 20-minute academic aptitude test and a 20-minute questionnaire on college plans and background information. This was typical of much of the activity in this field—the studies which have used tests have used only a single scholastic aptitude test or a few achievement tests. There was an urgent need for a *comprehensive* survey including aptitude, interest, motivational and background factors, to be accompanied by intermediate and long-range followups of the individuals studied in the survey.

As for the present status of the tools, techniques, and facilities necessary for collecting the type of facts mentioned above, rapid progress in developing suitable procedures has been made during the past few years so that a large-scale study of the type needed became feasible. Much progress was made during and after World War II in the development and use of multifactor testing batteries and other measurement devices. Followup studies were used extensively in the services during World War II, and recent studies by many investigators have improved the effectiveness of such techniques and increased the general level of know-how in this area. In addition, recent progress in the development and adaptation of high-speed electronic computers to the problems of scoring, analyzing and up-dating survey and test data now makes it possible to deal with formerly inconceivable numbers of cases and variables.

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[1] Toops, Herbert A. *A Proposal for a Standard Million in Computing Norms.* Proceedings of the Conference of State Testing Leaders. Committee on Measurement and Guidance of the American Council on Education, Washington, D.C., 1939, p. 29–38.

[2] Stice, G.; Mollenkopf, W. G.; *and* Torgerson, W. S.; *Background factors and college-going plans among high-aptitude public high school seniors.* Princeton: Educational Testing Service. 1956.

From the combination of growing demand, previous studies, and technical progress, Project Talent has emerged. In a sense, it is a *scientific* census, its initiation planned to coincide with the 1960 Federal census. It will be the first scientifically planned national inventory of human talents.

The goal of the project is to gain information which will help American youth develop their talents, and in so doing strengthen and develop the Nation. Its major objectives can be summarized broadly as:

1. To provide a scientifically planned national inventory of youth.
2. To determine the specific patterns of aptitudes, abilities, and interests which provide the best basis for various college courses and careers.
3. To carry out followup studies to determine the educational experiences which will contribute to the development of these aptitudes and abilities.
4. To determine the guidance procedures most effective in assisting each student to select the career which will assure him the greatest possible personal satisfaction and success.

SUMMARY OF DATA TO BE COLLECTED

Data of several kinds[3] will be collected from the students tested and from their schools (see table 1) and will become available to qualified researchers.[4]

Student Data

Data collected from students will include test scores, responses to various kinds of questionnaires, and special study information.

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[3] A complete description of the data-collection instruments and their development is planned for publication by the staff of Project Talent in late 1960 or early 1961.

[4] The battery of data-collection instruments has been developed by the central staff of Project Talent with the aid of committees of special experts. These tests will not be used commercially, and no commercial tests are included in the battery.

TABLE 1.—Data to be collected in Project Talent

APTITUDE AND ACHIEVEMENT TESTS

The Information Test
English: Effective expression
English: English usage
English: Punctuation
English: Capitalization
English: Spelling
Reading comprehension
Disguised words
Word functions in sentences
Word memory
Sentence recall
Arithmetic computation
Arithmetic reasoning
Mathematics through grade 9
Mathematics through grade 12
Abstract reasoning
Mechanical reasoning
Visualization in 3 dimensions
Visualization in 2 dimensions
Clerical checking
Table reading
Form perception
Creativity
Preferences (Speed of decision-making)
Special study tests (to be determined)

QUESTIONNAIRES AND DATA FORMS

Students:	Student information blank Student interest inventory Student activity inventory
School Personnel:	School principal's questionnaire Guidance program questionnaire Counselor's questionnaire

1. *Aptitude and achievement tests:*

INFORMATION TEST. Designed to measure the level of information in a number of academic areas, including areas not normally included in the high school curriculum. Among the areas are: Literature, music, art, social studies, mathematics, physical science, biological sciences, medicine, engineering and architecture, aeronautics and space, electricity and electronics, mechanics, military, accounting and business, farm and ranch, Bible, outdoor activities, sports, and domestic science.

ENGLISH. Includes usage, effective expression, punctuation, capitalization, and spelling.

READING COMPREHENSION. To measure ability to comprehend written materials dealing with various kinds of subject matter—social studies, natural sciences, purely literary passages.

DISGUISED WORDS. Measures language aptitude through the ability to form connections between letters and sounds. Each item consists of a word disguised by peculiar spelling: the subject must identify the one of five option words which means about the same thing. The items are not intended to measure spelling ability or vocabulary level.

WORD FUNCTIONS IN SENTENCES. Given a key sentence in which five words are underlined, the examinee is asked to indicate which word in one of the item sentences does the same thing as the underlined word in the key sentence. This knowledge of word functions appears to be involved in learning a foreign language.

Word memory test. Measures a kind of rote memory directly related to the ability to learn a foreign language. The student is given time to memorize words in a nonsense language and their alleged English equivalents; then he has time to practice recall, using a list of nonsense words arranged in a different order. In the test itself, the examinee is to indicate which is the correct English equivalent for the nonsense word.

Sentence recall test. Measures recall of meaningful material. The test consists of about 40 short sentences which the student has 6 minutes to memorize. The test items consist of some of these sentences in a different order, with one word omitted from each sentence. The task is to recall the missing word and identify its second letter.

Arithmetic computation test. Measures speed and accuracy of addition, subtraction, multiplication, and division.

Arithmetic reasoning test. Measures ability to do the kind of reasoning required to solve arithmetic problems but excludes arithmetic computation except at its simplest level.

Mathematics test. Measures the understanding of basic concepts rather than computational skills. Part 1 contains items which should be answerable by students who have completed mathematics courses through grade 9; part 2, items answerable by students who have had mathematics courses through grade 12.

Abstract reasoning test. A nonverbal measurement of inductive reasoning ability. Items consist of diagrammatic patterns with one missing portion to be selected from five options. Identification of the missing element depends on ability to determine inductively the logical relationship of the pattern.

Mechanical reasoning test. Measures ability to recognize the operation of everyday physcial forces and principles such as gravitation, pressure, equilibrium, temperature changes, etc., and understanding of basic kinds of mechanisms such as gears, pulleys, wheels, springs, or levers. Specific formal training and experience are minimized.

Visualization in three dimensions. Tests ability to visualize manipulation of a figure in three-dimensional spaces. A diagram of an unfolded object is presented and five choices, each of which might be the object when folded, are shown. The examinee is asked to choose which of the five objects the unfolded diagram would make if properly folded or cut.

Visualization in two dimensions. Measures ability to visualize spatial relations when orientation of a figure in two-dimensional spaces is changed. Each item consists of a diagram at the left followed by five diagrams to the right of it. The task is to determine which of the five diagrams is exactly the same as the one at the left. Four of the option diagrams have been rotated and reflected; the correct one, however, has been rotated only.

Clerical checking test. Measures both speed and accuracy in working with verbal symbols.

Table-reading test. Measures speed and accuracy in working with numbers.

Form perception. Tests speed and accuracy in perceiving small differences in form.

Creativity test. Measures ability to find ingenious solutions to problems. The examinee must think of a clever solution to a problem. The correct solution (word or phrase) seems to "click" into place, and the examinee has a definite feeling of closure when he identifies the solution. The choices are given in terms of the first and last letters of possible right answers.

Preference test. Measures speed of decision-making rather than preferences themselves.

2. *Questionnaires and data forms:*

Student information blank. This form contains questions on a broad range of individual experiences expected to be related to later educational and vocational behavior. It contains questions concerning objective, potentially verifiable, information, including:

1. *Classification questions*—age, sex, grade, and other relevant individual characteristics.
2. *Socioeconomic and sociocultural questions*—age at which money was first earned, how many books the family has, etc.
3. *The composition of the family*—information on number of brothers and sisters, whether both parents are living, etc.
4. *Hobbies and recreational activities.*
5. *Reading habits*—amount and type of nonrequired reading actually done over a given period of time.
6. *Work experience*—extent and type of work experience for which the student has been paid.
7. *Other activities*—organizational affiliations and activities, social and dating activities, ways in which the student uses an automobile, etc.
8. *Items related to school*—program of study, scholastic achievement, courses taken, amount of time spent studying, an estimate of the student's grades, awards won, etc.
9. *Use of guidance and counseling facilities*, if any are available.
10. *Plans for the future*—amount of education expected, plans to leave high school before graduation, plans to attend college, expectations of military service, etc.
11. *Health status.*
12. *Attitudes and values*—toward college, study habits, economic attitudes, and occupational values.
13. *Theme writing*—two 5-minute themes on the student's idea of an ideal occupation and what school means to him.

Student interest inventory. An inventory consisting of items sampling the domains of occupations and activities, and areas of interest, including: Sports, farm and ranch, literary-linguistic, musical, artistic, labor, social service, mechanical-technical, skilled trades, science, business-management, computation, office work, and sales.

Student activity inventory. This inventory is designed to collect information on the student's traits in terms of the kinds of things he does and the way he does them. He will be asked to describe himself, his activities, his feelings, and to provide general information which will be related to later behavior and success. The following traits will be measured by this inventory: Impulsiveness, persistence, calmness, cooperativeness, theoretical nature, social sensitivity, group centeredness, conventionality, leadership, vigor, productivity, tidiness, sociability, self-confidence, cheerfulness, culture, and talkativeness.

Special studies. A number of special studies are being considered for small or special subsamples of students; they may involve the use of individual and more complicated tests such as sociometric ratings, level of aspiration measures, Q-sorts, thematic analyses of students' themes, etc.

Data Collected From Schools

Much information will be collected from each of the participating schools as well as from their students.

School principal's questionnaire. This questionnaire has been designed for the high school principal, headmaster, or other authority in charge of the school. Although many valuable dimensions will be assessed, the questionnaire will be limited to the broad dimensions of the school as a unit. It contains questions in the following categories:

1. *Faculty.*—Questions will be asked regarding the position, age, years of teaching experience and degrees held by the respondent. Other questions will include the number of teachers in the school, the percent of male teachers, percent of teacher turnover, and the number of teachers with college degrees at different levels.
2. *The school and school system.*—Information will be gathered on the type of school, grades included, and the type of accreditation of the school. Other questions will include an estimate of the pupil-teacher ratio, the grading system, provision for special groups, eligibility by race, religion, etc.
3. *Community information and student background.*—Questions will be asked which will attempt to assess the type of neighborhood in which the school is located, cultural facilities and organizations available in this community, the racial structure of the school in its community, and some ethnic information.
4. *The school curriculum.*—This section will include questions on the school's educational philosophy, homogeneous grouping of students, availability of an enriched curriculum, and the types of curricula offered to the students.
5. *Advancement policy.*—Questions on midyear promotions, midyear graduations, acceleration policy, retardation policy, etc.
6. *Availability of extracurricular activities.*—The principal will be asked to check activities available to his pupils.

Guidance program questionnaire. This questionnaire is designed to find out whether or not the school has a guidance program and the degree of effort being put into the program. Some of the specific things to be determined from this questionnaire are:

1. *Resources.*—Existence of a program; number and background of staff; space, equipment, and other facilities; recent changes in personnel, tests, special programs, etc.; future plans.

2. *Process.*—Testing procedures—which, how often, to whom, why, etc.—kinds of problems brought to counselors; kinds of help given—tests, counseling, referral, conference with parents, etc.

COUNSELOR'S QUESTIONNAIRE.

The head of the guidance program will answer questions concerning the program as a whole.

Each counselor will also be asked to complete a short questionnaire covering his experience and training. Space will be provided for his comments on the goals or functions of a guidance program.

RESEARCH ON THE GIFTED THROUGH PROJECT DATA

Possible studies of gifted youth employing the project's data might be grouped into several categories: (1) Descriptive studies based upon the initial data; (2) followup studies; (3) follow-back studies; and (4) measurement research studies.

Descriptive Studies

Information available through Project Talent will make possible a more complete description of many of the important characteristics of gifted children. Some information will be corroborative of information gained through other studies; in other instances, new relationships will undoubtedly emerge. Many kinds of information can be studied either for the national sample or for such subgroups of it as are of particular interest. Studies can include determination of the averages, dispersions, correlations, and multivariate relationships in many areas. Since both the sample of schools and the sample of students are highly representative, excellent normative information against which to evaluate the results of any study or substudy will be readily available. Such normative information will be included in an early research report of the project and will be readily available to investigators.

Studies of the present descriptive type might well be concerned with three areas: personal characteristics of gifted youth, school policy and practice with respect to gifted youth, and special studies.

PERSONAL CHARACTERISTICS. Through the tests, data would be available on the following topics, which could form the basis for a study describing the personal characteristics of children gifted in some respect. Due to the capacities of modern computers, many variables can be evaluated simultaneously. Variables might include the description of a group of gifted (defined as appropriate) students with respect to:

Parents' education
Parents' occupation
Geographic distribution
Hobbies
Reading habits
Penmanship
Extracurricular activities
Sex differences in aptitudes
Sex differences in interests
Sex differences in life experiences
Educational plans and attitudes
Vocational plans and attitudes
Military plans and attitudes
Study habits
Marriage and family plans
Guidance and counseling history
Social development
Social facility
Work history
Economic aspirations
Consumer attitudes
Health

There is little to be gained in attempting to detail such studies. In essence they consist of defining a group of gifted youth according to some criteria and determining the central tendency, variability, distribution, and/or correlation of some of the above-listed variables. Such research, while methodologically routine, often suggests important causal and consequential relationships and at least contributes to rounding out a pertinent description of the thus-defined group of gifted students.

SCHOOL POLICY AND PRACTICE. Similarly many studies relating school characteristics to the various personal characteristics of a particularly defined group of gifted youth are possible. In addition, school policy and practice as it pertains to the problems of educating the gifted can be the subject of descriptive studies. Since the sample of schools is representative of the Nation, some conclusions can be drawn with respect to: (1) How schools handle gifted children, and (2) the relationship of various school characteristics to the present attitudes, achievements, and other characteristics of selected groups of gifted youth. Again, techniques employing multivariate analysis and modern computers make possible many comparisons with one or many control or background variables held constant. Types of school information of interest include:

Average class size
Per pupil expenditures
Library facilities
Preparation of teachers
Type of school
Type of guidance program
Course offerings
Size of school
Conditions of school plant
Type of school facilities
Kinds of teaching aids
Socioeconomic status of school districts
Remedial work available
Special and/or experimental curriculums
Extension services
Homework policies
Grading policies
Composition of the student body

Essentially the same types of studies are possible here as with the personal characteristics. However, such studies may not only try to describe school characteristics in terms of averages, variabilities, distributions, and correlations; they may also attempt to posit and test relationships between school policies and practices and the personal attitudes, achievements and other characteristics of the various groups of gifted youth in question. Such research advances knowledge with respect to understanding and describing gifted youth, and may result in the eventual establishment of important causal and consequential relationships.

SPECIAL STUDIES. Many special studies using subsamples and/or additional data-collection instruments could be designed. For example, during the next 4 years colleges may expect a certain percentage of their entering students to have been included in the current data gathering effort and thus will be in a position to do special studies of their own. These studies might tie intensive exploration of various points of special interest to the particular college to the general background data and information available in the survey. Either gifted or nongifted children could be studied and/or compared in such a context.

For example, a large university might wish to study the composition of its freshman class with respect to many of the personal characteristics outlined in the section above. The students previously tested who chose to enter *this particular college* might be compared on these characteristics to the national or regional sample. School characteristics of interest might be similarly examined. Furthermore, with this background of information the college could follow the students through their college careers and study the effectiveness of its own curriculum. Such self-study should be particularly revealing to the college with respect to its handling of students gifted in one area or another.

SAMPLE STUDY. One example of the many studies which might be done using some of data described would be a comparative study of the effectiveness of acceleration as opposed to enrichment as a means of modifying educational procedures to fit the needs of the gifted. The schools might be classified into three groups: (1) Those best described as using enrichment; (2) those using acceleration; and (3) those making no special provision for gifted children.

Such a study might define giftedness in many ways, though it is likely that it will be defined in terms of scholastic aptitude. While the project contains no intelligence test as such, the Information Test, in combination with several of the aptitude measures, is expected to correlate very highly with many of the widely used single measures of scholastic aptitude.

These treatments of gifted children might then be compared with respect to information of various kinds for the gifted children from each of the three groups of schools; the "no provision" schools would form a sort of control group. Techniques of multivariate analysis and the use of high-speed electronic computers make it feasible to hold constant such background and control variables as might otherwise distort the comparison. Questions such as the following might be answered:

1. Do gifted children from the "acceleration" schools attain levels of achievement comparable to those attained by gifted children from the "enrichment" schools? Does this question depend on the type of subject matter concerned? Do any background factors relate to the results of these comparisons?
2. Are these two treatments associated with differences in attitudes toward school, study habits, higher education, vocational and economic goals?
3. Is there any evidence of difference in personal adjustment related to these two treatments? If so, in what respects?
4. Do these two treatments relate in any way to differences in hobbies, reading habits, work experiences, or participation in extracurricular activities? If so, in what ways?
5. What are the differences in social development and group effectiveness associated with these two treatments?
6. Are students experiencing these treatments responsive to guidance and counseling in different ways and degrees?
7. What are the differences in *school* characteristics associated with these two different treatments of gifted youth?
8. What hypotheses of causal relationship can be developed for subsequent followup and test?

Followup Studies

Plans to follow up the students 1, 5, 10, and 20 years after their graduation will result in considerable information about the educational, vocational, and social development of the individuals in the sample. Since a great deal will be known about these persons from the initial testing, there will be an unexcelled opportunity for *longitudinal* study of the gifted individuals in the sample. Thus many hypotheses and predictions based upon the initial testing can be checked against the future behavior of *the same* individuals. The results of various educational practices can be examined and compared with actual future behaviors.

INDIVIDUAL FOLLOWUP. Some of the followup studies might include the following variables, with such of the initial variables held constant as desirable.

1. Prediction of vocation and vocational success.
2. Validation of early identification of the gifted.
3. Study of the present activities of students who tended to do less well than indicated by their abilities, and students who tended to do better than expected.
4. Marriage and family patterns for gifted youth.
5. Social mobility of the gifted.

6. Continuity of attitudes toward others and self.
7. Study of the effects of social and economic factors on future attainments of the gifted.

School followups. Some of the school variables which could be followed up in terms of the future behaviors of gifted students exposed to such school practices are given below.

1. Comparative study of the educational and vocational achievements and "successes" of students exposed to differing guidance practices, other variables held constant.
2. Long-term effects of special curriculums such as math, foreign language, etc.
3. Study of the long-range effects of acceleration versus enrichment with respect to education, vocation, and future achievements and attitudes.
4. Vocational selection, college-going, and college selection as a function of various high school characteristics, such as:
   - Education of staff
   - Experience of staff
   - Plant and facilities
   - Extent of community support of school
   - Region
   - Length of school year
   - Average class size
   - Size of school
   - Type of school
   - Homework policies

Sample study. In extending the sample study discussed before to the followup stages, questions such as the following might be answered at various times during the 20 years of followup:

1. Do gifted children from the "acceleration" schools appear to make more use of their gifts than those from the "enrichment" schools? Does this depend on the subject matter concerned? Does it depend on the length of time between initial testing and the followup?
2. Do educational, vocational, and economic attitudes persist over time? Is this related to the type of treatment (accelerated or enriched)?
3. Is there any continuing difference between treatments with respect to personal adjustments, marriage and family patterns, or life goals?
4. Do these students continue to be identifiable as gifted?
5. Do guidance and counseling appear to have been more helpful to students from accelerated or enriched schools?
6. Are there social and/or socioeconomic differences between children from the two treatments at any stage?
7. What implications for the earlier and better identification of the gifted develop from such a followup?
8. What are the long-term relationships between the various characteristics of a school, the two treatments, and the future achievements of these gifted children?
9. What predictions based on the initial data appear to be verified?

Follow-Back Studies

The "follow-back" technique is essentially the reverse of the followup technique. It consists of identifying individuals who were in an initial sample, asking them to provide information relating to their current status, and tracing back their experiences and important decisions to the time of their earlier testing. Due to the size of the sample, such a technique should be readily applicable to many future groups.

For example, since the project will test about 5 percent of our high school youth, 20 years from now, about 5 percent of all physicists, physicians, mechanics, persons in *Who's Who*, etc., in the right age range should have been included in the initial testing. By "following back" these groups, it may be possible to determine more clearly than ever before what factors made them what they are. A list of names of persons in a particular area such as science could be developed and then collated against the names of those in the original study sample. Those in the group thus identified as members of the original sample could be studied and compared with the rest of the sample to study differences at times of initial testing.

TYPES OF STUDIES. Individual information to be studied this way might include virtually all of the many kinds of information about individuals collected in the initial phases of testing. Once the group to be studied is defined, it is simply collated against the original study sample and the social, personal, aptitude, attitude, etc., characteristics of interest traced over the years. Possible groups of interest might be:

1. Eminent persons in any field of human endeavor, e.g., mathematics, science, literature, education, military service, etc.
2. Graduates of particular colleges and universities.
3. Criminals.
4. Unemployed persons.
5. Addicts.

The latter groups would be of particular interest to the study of the gifted, since these are patently cases where talents existed but were not utilized appropriately. Follow-back of the gifted persons in such groups might be expected to be particularly revealing.

Again, school characteristics could be studied in retrospect by looking at groups such as those described and following back to see what school experiences, policies, and practices seemed to characterize such groups originally.

SAMPLE STUDY. As an example of the follow-back technique a study of Fellows of the American Physical Society might be considered in more detail.

In 1983 or 1984, it could be expected that roughly 5 percent of the physicists in a certain age range in the Directory of the American Physical Society would have been members of the original sample. In addition, it would be expected that a large portion of these persons would have been members of the group of children identified on the basis of the original data collection as being gifted. At this point, the names of these persons could be collated against the Project records and original and followup data for *this particular group* identified. Thus it would be possible to study the characteristics apparently leading to fellowship in the American Physical Society, for example. It would be preferable, if the size of the group identified were large enough, to take random halves of the group, using the first half for study and hypothesis formulation, and the second half for cross-validation of trends and findings. Some of the questions that might be answered on the basis of such a study might be:

1. What proportion of the group of Fellows so identified was originally identified as gifted? What percentage came from "enrichment," "acceleration," and "no differential treatment" schools? What other school characteristics are associated with the gifted child who later became a member of this group?
2. What kinds of personal history patterns seem to be associated with becoming a member of this group? Do these patterns appear to differ for gifted and nongifted? In what ways?
3. What has been the apparent effect of school guidance and counseling procedures on becoming a member of the group? Does it appear to differ for gifted and nongifted?
4. How "successful" do these Fellows appear to be, materially and in terms of personal satisfactions? How creative are they? Are there any differences between gifted and nongifted on these points?
5. What kinds of socioeconomic patterns appear to lead to becoming a Physics Fellow?
6. What do these Fellows consider to be major choice points in their lives? Why are they physicists instead of something else? Are there any differences on these points for gifted and nongifted children?

Measurement and Educational Research Studies

It must be emphasized that the Talent battery *is not* and *will not become* available commercially. A limited number of sets of the battery can be made available, however, for qualified research, such as checking the standardization of well-known tests and batteries.

Equation studies. The matter of using Project Talent tests as a medium for equating earlier studies deserves further mention. Since the Project Talent battery is reasonably comprehensive, and since its norms will be based on a large nationally representative sample, it appears that this battery could become a standard used to equate and calibrate tests and batteries. Conversion tables might be prepared by means of which test scores on most cognitive tests could be converted to equivalent scores or combinations of scores. In such a way previous studies of the gifted (and other groups) could be meaningfully compared even though different cognitive tests were employed.

UNIQUENESS. Recently another important research use of the test battery has come to the fore. Flanagan[5] has developed a technique of assessing the unique contribution of any test to a battery of tests. In other words, this process assesses the extent to which a new test measures something (has specific variance) not already being measured by scores on one test or some combination of tests already in a battery. This additional contribution is called the "uniqueness" of the new test. If the new test measures nothing new, it is obviously a waste of time and money to include it in a battery.

Considering the size and representativeness of the initial sample, the current battery of tests could become a criterion against which to assess the uniqueness of many new, experimental, or proposed tests. By thus eliminating tests with no uniqueness in their early stages, publishers will be spared the expense of norming and promoting a new test which eventually proves to contribute nothing new, and the public will be exposed to fewer testing programs, thus alleviating what many educators are beginning to regard as an overexposure to testing. Finally, the identification of gifted youth (and other groups) will become more precise and efficient, as the only tests to be used will actually contribute otherwise-not-measured information about the subjects.

EDUCATIONAL RESEARCH. In addition to developing and confirming relationships between school policy and practice and the education of the gifted, studies need to be directed at the educational process itself: that is, to learn more about the *process* of education, particularly of the gifted, as well as more about gifted persons themselves. Thus, studies may be directed toward problems such as:

1. What are the most appropriate loadings of various subjects for children gifted in differing areas; what are optimum curriculums for gifted children generally?
2. What are the most appropriate teaching methods for students in general? Do they differ for gifted students?
3. What are the optimum characteristics of a good teacher of the gifted? What are the implications for the training and development of these characteristics?

SUMMARY

In summary, it seems clear that myriad opportunities are offered for the enhancement of our knowledge about gifted youth. Data will be collected for a 5-percent nationally representative sample of almost 500,000 high school students and for thousands more in small specialized substudies. Data will also be collected on the characteristics of the nationally representative sample of about 1,000 schools. Kinds of data to be collected include:

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[5] Flanagan, John C. *Flanagan Aptitude Classification Tests: Technical Report.* Chicago: Science Research Associates, 1959, p. 17–22.

1. For students: biographical information, aptitude and achievement test scores, interests, and personal activities;
2. For schools: a wide range of school characteristics and guidance and counseling program information.

Possible studies of gifted youth can be broadly summarized as follows: (1) Present descriptive studies where initial student and school data are used to describe gifted youth and their characteristics more fully and reliably; (2) followup studies wherein present descriptions and hypotheses are validated against the future experiences of the gifted, and such experiences are correlated with the student and school characteristics determined initially; (3) followback studies wherein groups of particular interest are identified 20 or 30 years from now and those members of the group who were part of the original sample followed back in an effort to determine the student and school characteristics and subsequent experiences that led to their membership in the group of interest; and (4) special research studies equating various tests, seeking to determine the uniqueness of various measures, attempting to relate the data collected to additional data derived from individual and/or more intensive investigation, or seeking to work only with particular local groups such as students entering a particular college. Further studies of education and educational processes in relation to gifted youth are also among the possible studies.